THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—44TH YEAR SYDNEY, SATURDAY, NOVEMBER 2, 1957 No. 18

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SOME RECENT CONCEPTS OF THE PHYSIOLOGY OF THE CEREBRO-SPINAL FLUID.[1]

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THIS is an over-simplified review of a complex and, as yet, poorly understood subject, for which I have relied greatly on a monograph by Davson (1956). In addition many individual papers have been consulted, though only a few of these can be referred to in the text. Indeed, the amount of active investigation which is being conducted in this field is enormous, and that the entire subject of the cerebro-spinal fluid physiology is being thoroughly reconsidered will be evident from Davson, who states in his preface:

> The view that the C.S.F. is formed by the nervous tissue rather than the choroid plexuses may well have to be taken more seriously than has so far been the case.

This does not mean, really, that we should discard all our previous beliefs about the cerebro-spinal fluid, but rather that we should be prepared to modify some, amplify others, and prepare for a period during which research in this field will pose more new problems than it will solve old ones.

[1] Part of a symposium on hydrocephalus. Read at a meeting of the Australian Pædiatric Association, Canberra, March 30 to April 1, 1957.

Formation.

No one who is familiar with the practical problems of the hydrocephalic state would be eager to accept the suggestion that the choroid plexuses play little or no part in the formation of the cerebro-spinal fluid. Even in the absence of any scientific proof of their function, it would be difficult to deny that the anatomy of these structures, with their large capillaries and enormous surface area, seems obviously designed for the purpose assigned to them for so long. Irrespective of any new facts which may be discovered or any attractive hypotheses which may be propounded, the pioneer work of Dandy must stand—even if the direct observation of Cushing is of more questionable significance. Dandy was one of the pioneers in this field, who demonstrated, among other things, that complete obstruction of the foramen of Monro produced dilatation of the corresponding ventricle, but only so long as the plexus of that ventricle was left intact. Cushing's report of seeing globules of fluid form on the surfaces of exposed plexuses, though not in question as an observation, is unfortunately not a suitable fact on which to base deductions, since this observation was made under the entirely non-physiological conditions of a zero cerebro-spinal fluid pressure. Nothing can alter the fact that obstruction to the cerebro-spinal fluid pathway will produce distension of the ventricles proximal to that obstruction, but only if the plexuses are intact; while if the block is by-passed, the normal dynamics of the cerebro-spinal fluid can be restored.

That the cerebro-spinal fluid is a simple ultra-filtrate of the plasma is no longer a defensible theory, and no dexterity of argument can explain the chemical constitution of the cerebro-

spinal fluid on the basis of filtration alone. There is no intrinsic reason why the choroid plexuses should not perform a secretory function, and indeed, the anatomy of the part and the specialized structure of the choroidal cells suggest that this may be, in fact, one of their primary functions. The rational hypothesis, which is being increasingly backed by experimental proof, is that three main processes are concerned in the formation of the cerebro-spinal fluid: (i) active secretion by the choroid plexuses; (ii) direct diffusion into the three major compartments—*i.e.*, the ventricles, the subarachnoid space and the extracellular neural compartment; (iii) direct passage, through intercellular pores, of substances of large molecular weight, especially protein.

Secretion.

By the use of the term "secretion", it is not meant to suggest that the choroidal cells function like endocrine glands, but rather that, like the cells of the urinary tubules, they perform work against a concentration gradient, and so produce a fluid which differs considerably from the parent plasma from which it is derived. Perhaps an even closer analogy would be with the red blood cell. We are all familiar with the high potassium, low sodium content of this cell—and this despite an environment which should lead to an equilibrium distribution by diffusion. That such an equilibrium is not reached is due solely to a continuous secretory activity—*i.e.*, an active transport mechanism which pumps potassium in and sodium out. In the case of the choroidal cells, it seems almost certain that one of their functions is to secrete a fluid of high sodium content. Perhaps other constituents, too, are secreted; but at least for the sodium ion there exists experimental proof. Further, a high sodium secretion would immediately provide a source of energy which could be used for filtration purposes across selective membranes.

In support of the theory that secretion plays a part in the formation of the cerebro-spinal fluid, it would be of value to trace the sodium ion, which should be found to enter the cerebro-spinal fluid predominantly, though not entirely, in the ventricles. These experiments have been conducted in man by removing very small amounts of cerebro-spinal fluid from needles left in position, so that a minimal disturbance is produced. By using radioactive sodium, Sweet *et alii* (1949) produced curves showing the rate of disappearance of sodium from the blood and its rate of appearance in the ventricles, *cisterna magna* and lumbar sac. These curves show that, while equilibrium is being established with the blood, higher concentrations of sodium occur in the ventricles than elsewhere. Indeed, the concentration of sodium in the ventricles was three and sometimes four times that in the cistern at the end of one hour, with an even greater differential prior to that. Quite a number of hours elapsed before the concentrations at these two points became the same, while the lumbar sac lagged even behind the cistern.

The second part of the hypothesis maintains that direct diffusion also plays an important part in cerebro-spinal fluid formation. This phase of the process can be examined by the use of D_2O, which is heavy water, and certain tagged electrolytes. It should be interpolated that in the particular experiments being discussed, only two of the three major compartments are being investigated. The third or extracellular neural compartment is more difficult to study, and though it has not by any means been neglected by the experimentalists, failure to consider it here does not affect the major thesis.

Bering (1952), using heavy water, proved conclusively that as far as that substance was concerned, diffusion and not secretion was the dominant mechanism. One might expect, if this was the case, that equilibrium between the plasma and the cerebro-spinal fluid would be established simultaneously in all parts of the two major compartments. In actual fact, the *cisterna magna* reaches equilibrium with the plasma sooner than the ventricles—an interesting state of affairs which, in itself, tends to support the diffusion hypothesis, because it is due to the fact that in this region the ratio of surface area to volume is greater than in any other part.

That certain electrolytes as well as water diffuse directly into the cerebro-spinal fluid is evident from the work of Sweet and Locksley (1953). For these experiments, patients were chosen in whom there was a complete block to the third ventricle, but in whom, some years before, the block had been by-passed by a tube. By clamping this tube it was possible to separate completely the ventricular and subarachnoid compartments. Using K^{42} and Cl^{36}, they were able so show that these ions appeared in the two isolated compartments and rose to an equilibrium with the plasma at roughly the same rates in the two compartments. However, the rates of appearance of the two ions were different; but this was to be expected and was simply an expression of the selective rates of diffusion which we know to exist across the blood cerebro-spinal fluid barrier. When the procedure was reversed and the isotopes were injected into the ventricles and the subarachnoid space, they moved freely into the blood-stream, and equally from the two compartments.

There is one pitfall which needs to be avoided in the interpretation of these experiments. They demonstrate, in the case of water and certain electrolytes, active diffusion into, say, the isolated subarachnoid space, but that is all they do demonstrate. There is nothing in these experiments which suggests that fluid, as such, is being formed anywhere except in the plexuses. Free exchange by diffusion is proven; bulk fluid formation is not.

For the third feature of the hypothesis, it is believed that protein enters the cerebro-spinal fluid in all compartments, and that it does so, not across cell membranes, which allow for selective diffusion, but through pores between the cells. Protein is, of course, a very slowly penetrating substance, as are other substances of high molecular weight. It occurs in the cerebro-spinal fluid in extremely small amounts, and it is only when a serious breakdown occurs of the barrier between the blood and the cerebro-spinal fluid that it appears in appreciable quantities. It is for this reason, presumably, that it is affected more by alterations in the barrier in pathological states than the other constituents of the fluid. Experiments suggest that much of the protein originates in the ventricles, but that further amounts are added in the other compartments.

Flow.

It is apparent then from these isotope studies that there is a rapid and direct exchange of electrolytes between the blood and the cerebro-spinal fluid, and that this is quite independent of the rate of flow. That flow does occur, however, is quite certain, and indeed, a slow rate of flow away from the ventricles would seem essential to prevent the accumulation there of protein and a resulting shift in osmotic equilibrium. By the use of radio-iodinated albumin, it can be shown that little or no protein is absorbed by the ventricles. Recent work therefore does not question the flow of the cerebro-spinal fluid, but it does suggest that the rate of flow is very much smaller than has been thought. Thus Dandy estimated the flow per day as some 300 to 400 millilitres, while Boyd set the figure even higher at 600 to 700 millilitres. Sweet and Locksley, during their work with isotopes, withdrew very small amounts of cerebro-spinal fluid at hourly intervals, so that the cerebro-spinal fluid pressure was kept virtually constant. They concluded that the net amount of cerebro-spinal fluid elaborated per day was small—something in the order of 10 to 20 millilitres—and this figure seems now to be fairly generally agreed upon.

If one believes that the flow of cerebro-spinal fluid is partly designed to maintain a constant level of the cerebro-spinal fluid protein, and that protein can be removed only in the villi, then the direction of flow of the cerebro-spinal fluid is fairly obvious. However, attempts to study the direction of flow present many difficulties, of which the most obvious is the disturbance produced in the circuit by the removal of cerebro-spinal fluid and its replacement by dye, which is the usual experimental method adopted. It is well known that the introduction of a dye into the lateral ventricle is followed, in the normal system, by its appearance in the cisternal fluid in a few minutes, though its appearance in the lumbar sac is very much delayed. Very variable figures have been obtained for movements of dyes in the subarachnoid compartment, and even the slightest movement or a cough will alter the result, which is, in itself, a significant observation. It seems that we must accept, without any absolute proof, that there is a flow from the ventricles to the venous sinuses; but even that leaves in question the state of the fluid in the spinal theca which, it has been seriously suggested, does not flow with the direct ventricular current. A very thorough experiment was conducted by Sachs *et alii* (1930), quoted by Davson, in an attempt to solve this problem. They exposed the entire spinal thecа in dogs and introduced a dye into the subarachnoid space, using the replacement technique. They could demonstrate no direction of flow in these experiments, and as long as the animal was immobile the movement of the dye in the spinal theca was equivalent to that

in a column of fluid in a glass tube, except for an up-and-down movement correlated with the arterial pulse. As a result of experiments of this type, it is believed that movement of fluid in and out of the spinal theca is dependent, not on a head of pressure from the choroid plexuses, but on changes in pressure from arterial pulsation, coughing and changes in posture.

Absorption.

When we come to consider the absorption of the cerebro-spinal fluid, much of what has been said regarding the active diffusion of water and electrolytes applies equally to formation and absorption. However, it is necessary to account for the removal of protein, and it is in this particular moiety of the cerebro-spinal fluid that the arachnoid villi appear to play their main role. Experimentally, the studies of Courtice and Simmonds (1951) leave no doubt as to the existence of a direct pathway for plasma proteins from cerebro-spinal fluid into the blood, and this most probably across the mesothelium of the arachnoid villi. What still remains uncertain is the degree of permeability of the arachnoid villi to colloidal matter; and on this, of course, depends the relative importance of the difference in pressures between the cerebro-spinal fluid and the blood in the dural sinuses. It seems likely, too, that bulk reabsorption of cerebro-spinal fluid takes place through small veins draining into the sinuses, as well as by arachnoid villi.

Conclusion.

The choroid plexuses play an important role in cerebro-spinal fluid production, since they actively secrete some constituents—*e.g.*, sodium—and they are the fountainhead of bulk cerebro-spinal fluid formation to the extent of some 10 to 20 millilitres per day. However, there is a constant exchange by diffusion between the plasma and the cerebro-spinal fluid, with the production of a steady state of equilibrium determined by speed of penetration and rapidity of removal. Direction of flow is determined by the formation in the plexuses and removal by the villi, which latter structures are probably almost the sole locus of protein removal. Finally, the fluid in the spinal theca, though by no means stagnant, is not influenced by the flow from plexuses to villi.

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HYDROCEPHALUS IN CHILDHOOD.[1]

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THE diverse causes of hydrocephalus in childhood are disclosed by an examination of the brains of 110 hydrocephalic children, who in the last seven years have died at the Royal Children's Hospital, Melbourne. This is not the total number of hydrocephalic children upon whom post-mortem examinations have been performed, but represents the number in whom the basic pathological changes have not been obliterated by infection.

For further discussion these can be divided into the following groups: (i) *spina bifida*, (ii) narrow aqueduct of Sylvius, (iii) chronic basal meningitis, (iv) arachnoid cysts, (v) various abnormalities.

Spina Bifida (40 Subjects).

The association of hydrocephalus with the presence of a meningo-myelocele and the Arnold-Chiari malformation is well known. The foramina of exit of the fourth ventricle are situated within the spinal canal. The presence of the cerebellar tonsils and portion of the elongated medulla within the *foramen magnum* impedes the passage of cerebro-spinal fluid to its main site of absorption over the cerebral vertex, and hydrocephalus develops. This obstruction is well demonstrated by ascending infection of the meninges where the spinal subarachnoid space and the ventricular system contain pus, but infection is absent over the external surface of brain and cerebellum. In a certain number of these subjects, and also in children with a meningocele, another malformation—namely, "forking" of the aqueduct of Sylvius—may be responsible for the development of hydrocephalus. This combination of meningocele and forking of the aqueduct has been observed in several children.

Narrowing of the Aqueduct of Sylvius (Six Subjects).

In this group the lateral and third ventricles are dilated, whilst the fourth ventricle is of normal size.

The term "stenosis" is given by Russell to an aqueduct which is abnormally small, and around which there is no increase of glial tissue. This has been seen on two occasions, once in association with an occipital meningocele. The other infant, who had congenital hydrocephalus necessitating Cæsarean delivery, died at the age of two days.

Forking of the aqueduct was present in another infant with congenital hydrocephalus, delivered in a similar manner, who died at the age of fifteen weeks. This malformation, in which the aqueduct is represented by two narrow channels situated in a sagittal plane and separated by normal brain tissue, has also been found in several infants with *spina bifida*.

Gliosis of the aqueduct was found in three cases. In this condition the aqueduct is represented by several small channels and groups of ependymal cells surrounded by fibrillary astrocytic tissue. This overgrowth of glial tissue is regarded by Russell as a malformation, the absence of leucocytes excluding an inflammatory basis. These three children, in whom hydrocephalus was noted at or soon after birth, died at nine months, two and a half years, and three years respectively.

Finally, the aqueduct may be obstructed by the products of an inflammation within the ventricles, or by the organization of this inflammatory exudate. This has been seen on several occasions, usually in infants with *spina bifida*.

Chronic Basal Meningitis (54 Subjects).

Chronic basal meningitis was of three types—tuberculous meningitis, suppurative meningitis and basal arachnoiditis.

Tuberculous Meningitis (30 Subjects).

With the advent of therapeutic agents active against *Mycobacterium tuberculosis*, it became obvious that many children with tuberculous meningitis died, not because of the presence of tubercle bacilli within their meninges, but because of the occlusion of the subarachnoid space by fibrous tissue.

The duration of illness in these 30 children varied from seven weeks to 14 months, and dilatation of the entire ventricular system was present in varying degree in all. The sites of obstruction have been well demonstrated by encephalography as occurring in the region of the optic chiasma and beneath the *tentorium cerebelli*. At necropsy the subarachnoid space in these regions is seen to be obliterated by tuberculous granulation tissue. Another factor which may play a part in the diminution of cortical tissue is the endarteritis associated with the chronic meningeal inflammation. This may be gross, and cause infarction and cyst formation.

Suppurative Meningitis (12 Subjects).

Prior to the use of chemotherapeutic agents hydrocephalus invariably followed meningitis if the duration of life was sufficiently prolonged. A similar course is still followed by children with meningeal inflammation caused by organisms for which no effective therapy is available—*e.g.*, *Pseudomonas pyocyanea*, salmonella and *Bacterium coli*. But in this group are also included children with meningitis due to *Hæmophilus influenzæ* (4) and *Neisseria meningitidis* (2). Incorrect diagnosis or late recognition of the nature of the illness has resulted in treatment that has been "too little or too late". This group, also, are killed by mechanical rather than by infective means, and their hydrocephalus develops whilst we watch them.

[1] Part of a symposium on hydrocephalus. Read at a meeting of the Australian Pædiatric Association, Canberra, March 30 to April 1, 1957.

Basal Arachnoiditis (12 Subjects).

This group is similar to the previous two in its basic nature. The entire ventricular system is dilated, and encephalography demonstrates that the cerebro-spinal fluid flow is obstructed at the foramina of exit of the fourth ventricle, or in the *cisterna ambiens*, or at the level of the tentorium. At operation or necropsy the meninges in these regions were seen to be more opaque and thicker than normal, and in several the foramina of Luschka were occluded by a membrane of fibrous tissue.

On analysis of this group, it appears probable that the majority, if not all, of these infants and children developed basal arachnoiditis after intracranial hæmorrhage, the presence of blood in the meninges exciting an inflammatory response. Fibrosis is not present to the same extent as in chronic bacterial meningitis, but is sufficient to impede the flow of cerebro-spinal fluid.

A history compatible with intracranial hæmorrhage at birth or in the neonatal stage was obtained in 9 of 11 cases. One other subject was a prematurely born twin. Similarly, in 9 cases (not identical with the previous 9), gradual enlargement of the head was noted by the mother about the third or fourth week after birth. The ages at which medical advice was sought differed considerably, probably with the rate of enlargement of the head—a feature which in this group appeared to vary considerably.

Brown pigment within the thickened meninges around the base of the brain, or hæmosiderin detected by the Prussian blue reaction, was noted in 9 of the 11 children. It is difficult to assess the value of the demonstration of this pigment, as the majority of these patients had operative procedures undertaken within their cranial cavity.

However, from this series it appears probable that the majority of cases of hydrocephalus due to basal arachnoiditis—and it is a large group—occurs in infants in whom intracranial hæmorrhage has occurred at birth. Presumably the rate at which hydrocephalus develops is proportional to the degree of fibrosis or obstruction present, and this in turn to the amount of hæmorrhage.

One baby deserves special mention. He died at the age of four days with dilatation of all ventricles due to basal arachnoiditis. The meninges around the base of the brain were thick and vascular. On examination of sections, fibrous tissue infiltrated by lymphocytes and histiocytes was found to be present. The histiocytes contained hæmosiderin. There was no evidence suggesting birth trauma, and presumably intracranial hæmorrhage occurred *in utero*.

A similar case was recorded by Palmer (quoted by Russell, 1949).

Arachnoid Cysts.

Three arachnoid cysts are included in this series. One was situated in the region of the optic chiasma, and two were between the cerebellum and the tentorium. At necropsy the entire ventricular systems were dilated. The walls of these cysts were composed of fibrous tissue, and hæmosiderin was demonstrable in their walls. Intracranial hæmorrhage had been demonstrated after birth in one child, and another one was stated to have had a difficult delivery.

Operative procedures were undertaken on these children, and unfortunately all died from meningitis. It was therefore difficult to assess the nature of adhesions around the base of the brain; but in two cases at least it did appear as if chronic basal arachnoiditis was also present, and in one further case small cysts were seen. Therefore the conception of these cysts is that they were localized collections of fluid formed as a result of basal arachnoiditis, which in turn was probably due to intracranial hæmorrhage.

Various Abnormalities (Seven Subjects).

Four other types of abnormality were found *post mortem* in these cases.

Papilloma of the Choroid Plexus.

Excess secretion of cerebro-spinal fluid is always listed as a possible cause of hydrocephalus. However, cases in which one can exclude all other possible causes have been recorded only rarely.

One infant presented with an enlarged head when aged three months. The cerebro-spinal fluid had a high protein content and slight excess of cells. He died after persistent vomiting. At necropsy dilatation of all ventricles was present. He had a large papilloma of the choroid plexus of the right lateral ventricle. However, areas of degeneration were present in the papilloma and were associated with inflammation. Basal arachnoiditis possibly associated with these inflammatory changes was present, and was probably the cause of the hydrocephalus.

For similar reasons, it is difficult to assess the hydrocephalus in an infant who died from carcinoma of the choroid plexus of a lateral ventricle. In this instance, also, similar inflammatory changes were present causing some degree of obstruction.

Sinus Thrombosis.

There were two subjects in whom sinus thrombosis was found.

One infant died at the age of one year with dilatation of the ventricular system, which was most obvious in the anterior horns of the lateral ventricles. There was a history of *otitis media* four months previously. This had been followed by convulsions and spasticity. At necropsy the sagittal sinus, left lateral sinus and cortical veins were thrombosed.

The other infant was noted to have hydrocephalus when aged five weeks. He died at the age of seven weeks, and dilatation of all ventricles was found at post-mortem examination. The sagittal sinus, the straight sinus and portions of the sigmoid sinus were obliterated and represented by fine fibrous cords without a lumen. Unfortunately no sections were taken, and the nature of the occlusion must be uncertain.

Tuberous Sclerosis and Osteochondrodystrophy.

In two cases of tuberous sclerosis dilatation of all ventricles was present, and also in one case of osteochondrodystrophy.

Occlusion of the Foramina of the Fourth Ventricle.

The foramina of the fourth ventricle may be occluded by neuroglial septa of developmental origin. The resultant gross dilatation of the fouth ventricle may be associated with cerebellar malformation. This abnormality is to be distinguished from occlusion of the same foramina by tissue of inflammatory origin. It has been discussed by Reye and Sofer Schreiber (1954).

Conclusion.

The various causes of hydrocephalus in childhood as seen by a morbid anatomist have been discussed. However, it must be realized that this series would be twice as large but for the presence at the hospital of an efficient neurosurgical unit. The comparative lack of success in treating infants with myelomeningocele and the Arnold-Chiari malformation contrasts with the successful treatment of the other groups.

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HYDROCEPHALUS IN INFANCY: CLINICAL FEATURES DIAGNOSIS AND TREATMENT.[1]

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THE incidence of hydrocephalus in infants is stated to be 0·2%, and it is said that the condition is somewhat commoner in boys than in girls, and that the proportions of the two types, communicating and non-communicating, are roughly equal.

The following tabulation and Table I present an analysis of the 82 subjects with hydrocephalus admitted to the Royal Alexandra Hospital for Children during the past five years, 1952 to 1956. (Cases associated with *spina bifida* are not included.)

Male subjects: 53 (65%).

Female subjects: 29 (35%).

Communicating hydrocephalus (37—45%): male subjects, 25; female subjects, 12.

Non-communicating hydrocephalus (45—55%): male subjects, 28; female subjects, 17.

CHARACTERISTIC FEATURES OF HYDROCEPHALUS.

The characteristic features of hydrocephalus are as follows.

Globular Enlargement of the Head.

The head enlarges in all diameters, which produces a characteristic globular shape. The fontanelles enlarge, the sutures

[1] Part of a symposium on hydrocephalus. Read at a meeting of the Australian Pediatric Association, Canberra, March 30 to April 1, 1957.

separate, and the head appears large with respect to the face and chest. The enlargement may occur very insidiously or very rapidly. Whilst in cases of congenital hydrocephalus the head may be so large at term that birth is impossible, this is not necessarily so, and Dandy has shown that the ventricles may be greatly dilated in a new-born baby whose head is of approximately normal size.

Whilst the large head in advanced hydrocephalus is obvious to everyone, the early stages may be difficult to detect. Of more significance than any one head circumference measurement are repeated measurements which indicate that the rate of growth of the head is abnormally rapid.

Raised, Non-Pulsating Anterior Fontanelle.

The fontanelles, especially the anterior fontanelle, often become raised and tense. In a normal, healthy infant the fontanelle is slightly depressed, and pulsates when the child is held in the sitting position and is not crying or straining. If the fontanelle is raised, does not pulsate and feels tense under these conditions, increased intracranial pressure is present.

TABLE I.

Non-Communicating Cases.

Underlying Abnormality.	Number of Cases.
Stenosis of the foramen of Munro	1
"Stenosis" of the aqueduct of Sylvius ..	15
Posterior fossa adhesions	7
Posterior fossa cysts due to congenital atresia of foramina of Luschka and Magendie ..	9
Other	13
Total	45

However, it must be remembered, that progressive hydrocephalus with rapid enlargement of the head and associated brain destruction can occur without this fontanelle evidence of increase in intracranial pressure.

Macnab (1955) states that clinical recognition of tension in the anterior fontanelle is not present until the ventricular pressure measured in the horizontal position is in the neighbourhood of 250 millimetres. Yet in many cases rapid enlargement of the head has occurred when the ventricular pressure ranged from 110 to 180 millimetres. Macnab also found that the ventricular pressure range tended to be between 50 and 180 millimetres in cases of progressive communicating hydrocephalus, as against a ventricular pressure of 250 to 300 millimetres and over in cases of intraventricular block. He recalls that O'Connell (1943) has shown that with an average spinal pressure of 120 millimetres, 80 millimetres of that pressure is a variable factor dependent upon changes occurring in the cardiac and respiratory cycles. This means that the cerebro-spinal fluid has a pulsatile thrusting force, which can easily push out the poorly developed and ununited skull bones, thus reducing the intraventricular pressure.

The Turning Down of the Eyes.

Downward turning of the eyes is a very valuable early sign of hydrocephalus. It is stated that the roofs of the orbits are pressed downwards, with resultant protrusion and rotation of the eyeballs, and also that the upper eyelids are pulled up owing to the tightness of the scalp, so that an abnormal amount of sclerotic becomes visible above the iris. There must also be cerebral oculo-motor factors causing this phenomenon, as it is sometimes (but not always) found that the eyes are restored to their normal position as soon as the ventricular pressure is relieved.

Distended Scalp Veins.

When the intracranial pressure is high, the scalp veins become distended and prominent, because of their connexion by emissary veins with the intracranial veins.

Delay in Holding up the Head.

The large size and weight of the child's head make it impossible for the infant to hold up his head at the proper time. In cases in which great brain destruction has occurred, retarded cerebral development will also be a factor.

Other Neurological Signs.

Owing to the expansibility of the skull in infancy, the familiar symptoms of increased intracranial pressure are slight or absent, and hydrocephalic babies seldom vomit or seem unhappy. Convulsions are not common unless birth hæmorrhage or meningitis has been the cause of the hydrocephalus. Random eye movements, nystagmus and strabismus are often seen. Usually, in advanced cases, mental deficiency and some motor weakness and incoordination with spasticity of the lower limbs are present.

DIAGNOSIS.

The following must be considered in the differential diagnosis: (i) The normal child with a large head (macrocrania); (ii) the healthy premature infant; (iii) chronic subdural hæmatoma; (iv) cerebral tumour; (v) external hydrocephalus; (vi) macrencephaly; (vii) hydranencephaly; (viii) *hydrocephalus ex vacuo*.

The Normal Child with a Large Head.

In these cases the facial features are usually proportionately large, whereas in the child with hydrocephalus they are relatively small, and so are overshadowed by the globular top to the head. The condition is sometimes familial, and for this reason it is useful to see both parents. One should beware of this diagnosis, however, as it is not uncommon to find that the large head in a slowly progressive case of hydrocephalus has been so excused by both parents and doctor.

The Healthy Premature Infant.

Healthy premature infants are often supposed to be suffering from hydrocephalus because of the rapid growth of their heads. Macnab (1954) points out that the average increase in the circumference of the normal head in the first three months is 1·2 inches, and that some normal premature infants' heads may increase three inches in the first three months of life. In infants suspected of hydrocephalus in the first three months of life, the average increase in the circumference over this period is three inches. Prematurity, therefore, may upset our standards for assessing the rate of growth of the head of the normal infant.

Ford (1952) applies the term "pseudohydrocephalus" to a condition seen in some premature babies whose head grows with great rapidity during a period between the second and the eighth months after birth. He states that during this time a striking disproportion may be apparent between the size of the head and that of the body, so that hydrocephalus is suspected.

A corollary to this difficulty is, of course, that a true case of hydrocephalus may be misdiagnosed as the pseudo-hydrocephalus of prematurity.

Chronic Subdural Hæmatoma.

Every year several infants are examined with a diagnosis of hydrocephalus, who turn out to have bilateral subdural hæmatomata. Clinically, there is a very close resemblance between this condition and hydrocephalus. Occasionally a pre-investigation diagnosis is made, because of the history of injury or the presence of retinal hæmorrhages. Usually, however, the condition is discovered when subdural taps are performed as the first step in the investigation of any case of suspected hydrocephalus.

Cerebral Tumour.

Brain tumours are rare in young infants, especially in the first six months of life, in which period hydrocephalus is most common. Signs which should make one suspect a brain tumour as the cause of the hydrocephalus are vomiting, marasmus, cranial nerve palsies, limb weakness, and abnormal cerebro-spinal fluid—especially raised protein content, xanthochromia and pleocytosis.

Baily (1939) states the position as follows:

> During the latter half of the first year one should always suppose that a tumour is the cause, but subdural hæmatoma should be ruled out first. In older children the most common cause of increase in the size of the head is tumour.

When tumour is thought to be a possible cause of the hydrocephalus, it is important to perform complete air studies by ventriculography.

The hydrocephalus in cases of tumour is of the non-communicating variety, and is due to intraventricular obstruction to the circulation of the cerebro-spinal fluid. An exception to this is the lateral ventricle choroid plexus papilloma. This tumour, because of over-secretion of cerebro-spinal fluid, may cause a communicating hydrocephalus in spite of the absence of any obstruction to the circulation or to the absorption of the cerebro-spinal fluid. Dorothy Russell (1949) regarded hydrocephalus from over-secretion of cerebro-spinal fluid as non-proven. However, the case of Kahn and Luros (1952) provided an unequivocal demonstration of excessive secretion overwhelming the mechanism of absorption. Their patient, with papilloedema, increased intracranial pressure and grossly dilated ventricles, was restored to normal by the removal of a papilloma of the choroid plexus. A very fascinating case is reported by Ray and Peck (1956). Their patient, an infant, aged two months, in whom an incomplete (bubble) air study using 60 millilitres of air demonstrated grossly dilated ventricles, was treated for communicating hydrocephalus by lumbar-arachnoid ureteral shunt. The cerebro-spinal fluid was normal in composition. The child lost so much fluid in the urine that the shunt tube had to be transferred to the peritoneal cavity. The abdomen then became grossly distended with fluid, causing embarrassment from pressure. At operation the infant was found to be suffering from bilateral choroid plexus papillomata.

External Hydrocephalus.

There is a small, ill-understood group of cases in which the head is moderately enlarged, and there is evidence of moderate increase in intracranial pressure—such as separation of the sutures, bulging of the fontanelle—yet the ventricular system is normal or only mildly dilated. There is often dilatation of the cortical subarachnoid spaces.

In some of these cases the cerebro-spinal fluid protein level is raised, and the history suggests birth trauma. Bagley (1949) suggests that the condition is due to the ill effects of blood in the cerebro-spinal fluid causing choking of the absorption channels, and aseptic inflammatory reaction in the leptomeninges retarding the absorption of the cerebro-spinal fluid and increasing the cerebro-spinal fluid pressure.

In other cases the cerebro-spinal fluid is clear. Macnab (1955) suggests that in these cases there is an imbalance between the rate of formation of the cerebro-spinal fluid and its absorption by the arachnoid villi, a balance being struck at a higher level of cerebro-spinal fluid pressure than normal. He states that the eyes do not look down in these cases.

It is possible that a thrombosis of the superior longitudinal sinus may also be a cause of this condition.

As an example of this unusual condition, the case of a female child is outlined. She was a premature baby, and the delivery was precipitate. Her head was noted to be larger than normal at the age of seven weeks. At the age of four months it was 17·5 inches. At the age of eight months it was 19 inches, and the fontanelle was large and bulging. The eyes did not look down. Subdural taps gave negative results, the cerebro-spinal fluid was clear, and a pneumo-encephalogram showed mild dilatation of the lateral ventricles. At the age of two years and nine months the child appeared to be of normal development save for her big head, which was now 21·4 inches. The cerebro-spinal fluid pressure (measured under anæsthesia) was 290 millimetres, and a pneumoencephalogram showed a normal ventricular system. Bilateral subtemporal burr holes (made to exclude subdural fluid collections) revealed grossly distended subarachnoid spaces.

Macrencephaly.

Macrencephaly is a rare condition in which the brain is hypertrophied and malformed. The head, which may be larger than normal even at birth, begins to grow rapidly soon after birth. The fontanelles remain open, but there are no signs of increased intracranial pressure. Within a few weeks or months it becomes apparent that the child is mentally defective, and epilepsy is common. Clinically hydrocephalus is suspected, and the diagnosis is based upon normal finding on air studies in such a case.

Hydranencephaly.

Hydranencephaly is a rather uncommon condition which in many respects simulates hydrocephalus. There is an absence of the upper portion of the cerebral hemispheres, the basilar portions of the cortex are partially preserved, and the basal ganglia, brain stem and cerebellum are generally fairly well formed. The meninges are intact, and the ventricles and cortical subarachnoid space are widely open to each other. The dilatation of the head and the increase in cerebro-spinal fluid pressure appear to be due to an impaired absorption of cerebro-spinal fluid, and not, in most cases, to any obstruction to its circulation (Picaza, 1955). The malformation appears to be caused by intrauterine injury to the blood supply of the brain occurring after the fifth month of prenatal development. Clinically, the condition differs from hydrocephalus in that the face is expressionless, the head is translucent, and optic atrophy, convulsions and paresis are often present.

Hydrocephalus Ex Vacuo.

In hydrocephalus there is an increase in the amount of cerebro-spinal fluid, which is, or has been, under increased pressure and has therefore dilated the ventricles. This "internal" and "hypertensive" hydrocephalus is to be differentiated from "compensatory" hydrocephalus or hydrocephalus "*ex vacuo*"—a condition in which the ventricles and subarachnoid pathways are enlarged to fill the space remaining after cerebral atrophy.

Investigation of a Case of Suspected Hydrocephalus.

The following is the plan of investigation when hydrocephalus is suspected.

X-Ray Examination.

Plain X-ray films of the skull are taken. Characteristically an enlargement of the head is seen in all diameters, with a disproportionately small face, enlarged persistent fontanelles, widened sutures and thin bones. Small supernumerary (wormian) bones are often present, especially in the lambdoid sutures. In infancy the sella usually preserves its form.

Occasionally a clue as to the nature of the hydrocephalus is present. Stenosis of the aqueduct is associated with a very shallow posterior fossa, whereas hydrocephalus due to congenital atresia of the foramina of Luschka and Magendie is usually associated with an enormously enlarged posterior fossa. This can be determined in the plain X-ray film only if the line of the transverse sinus is evident. Spotty, diffuse calcification may indicate toxoplasmosis.

Subdural Tapping.

Under general anæsthesia, bilateral subdural tapping is carried out through the coronal sutures to rule out the possibility of chronic subdural hæmatomata.

Ventricular Puncture and Dye Test.

If the subdural tapping gives negative results, a lumbar puncture needle is inserted through the coronal suture into the lateral ventricle, the depth at which the ventricle is encountered is noted, and a specimen of ventricular cerebro-spinal fluid is obtained and inspected.

In cases in which the ventricle appears small, this ventricular estimation may be all that is necessary to rule out the condition. The opportunity is usually taken to inject a few millilitres of oxygen and to take X-ray pictures to provide a record of ventricular size, in case later comparison is indicated.

When the ventricle appears enlarged, a dye (usually one millilitre of phenolsulphonephthalein) is injected and the needle is withdrawn.

Air Studies.

The infant is then sat up, and a lumbar puncture is performed. A pneumoencephalographic examination is carried out, usually about 30 to 40 millilitres of oxygen being used.

In cases in which the hydrocephalus is of the freely communicating variety, the flow of cerebro-spinal fluid is very free, the dye quickly appears in concentration (within five minutes), and the serial X-ray films show that the air has freely entered the dilated ventricles. The size of the ventricles and the thickness of the "cortex" (measured from the inner table of the skull to the outer wall of the ventricle) are well demonstrated.

In cases of non-communicating hydrocephalus, often (by no means always) the ventricular fluid is yellow in colour. The appearance of the dye is greatly delayed, and often the flow of cerebro-spinal fluid is poor. Oxygen, if injected, fails to enter the ventricles freely.

In cases of myelo-meningocele, or if the ventricular cerebro-spinal fluid is yellow or blood-stained, or if there is reason to suspect a cerebral tumour or a non-communicating hydrocephalus, a ventriculographic examination is performed instead of lumbar pneumoencephalography, about 50 millilitres or more of oxygen being used.

This routine differs from that followed in some clinics, in which elaborate pressure studies and more complicated and comprehensive dye tests are carried out. Lumbar pneumoencephalography is not performed, only ventriculography. However, we have thought that, as well as demonstration of the presence and degree of the hydrocephalus, the main point to be determined is the presence or absence of communication, and in our hands the most clear-cut evidence of this has been ready filling of the ventricle with air introduced from below. With proper selection of cases, we have not seen ill effects in cases which have subsequently proved to be of the non-communicating type.

Indications for Operation in Infantile Hydrocephalus.

Once the diagnosis of hydrocephalus and its type (communicating or non-communicating) have been established, a decision must be made as to whether surgery is required.

The three following questions have to be answered.

1. Is the hydrocephalus progressive or stabilized (arrested)? The answer to this is usually obvious. The history of increasing head size, the raised tense fontanelle, the separated sutures, the distended scalp veins, the downward-looking eyes, all bear witness to the progressive nature of the condition, and to the necessity for speedy relief. Sometimes, especially in older infants, it is difficult to differentiate between arrested and slowly progressive hydrocephalus. Repeated head measurements, and pregress air studies with careful comparative measurement of the thickness of the cortex are then necessary. Again, in acute cases of progressive hydrocephalus following meningitis, not infrequently stabilization occurs (because of the recanalization of the inflammatory adhesions in the subarachnoid spaces by the thrusting pulsatile force of the cerebro-spinal fluid) and if temporary relief by repeated lumbar puncture is provided, operation may not be required.

2. Has such gross brain destruction occurred that successful operative relief of the obstruction will not produce an acceptable result? Scarff (1952) has pointed out that the selection of patients suitable for surgical treatment cannot be based upon the external size and shape of the infant's head. The most important single determinant of the intellectual potential of the infant is the thickness of the remaining cerebral cortex as revealed by air studies. On the basis of his considerable experience, Scarff believes that a uniform cortical thickness of two centimetres or more will permit an average intellectual development, that cortical thickness of less than one centimetre certainly precludes normal intellectual development, and that an infant with a cortex between one and two centimetres thick appears to have a 50% chance of average mental development. An only moderately enlarged head may be associated with very gross brain destruction, and a grossly enlarged head may yet contain a brain only moderately destroyed.

3. Is the hydrocephalus associated with meningomyelocele? All infants with meningomyelocele who develop progressive hydrocephalus show post-mortem evidence of the Arnold-Chiari malformation, and about 50% of infants with meningomyelocele will show evidence of progressive hydrocephalus. In the great majority of such cases there is clinical evidence of progressive hydrocephalus by the fourth month of life, and in these cases the posterior fossa is abnormally small. Cameron (quoted by Macnab, 1954) has shown that the hind brain, as well as expanding downwards as the Arnold-Chiari malformation, may expand upwards through the tentorial notch to a considerable extent. These herniations are associated with arachnoiditis. The arachnoid is thickened, adherent and congested, and the subarachnoid space becomes obliterated. In some cases the arachnoiditis also obstructs the foramina of the fourth ventricle, converting a communicating hydrocephalus into a non-communicating type. A frequently associated malformation is stenosis of the aqueduct of Sylvius. Thus, the following deductions may be made:

1. When hydrocephalus is present at birth or develops rapidly in the early months of life, it is likely that there is present a severe grade of stenosis of the aqueduct as well as a large Arnold-Chiari malformation and extensive arachnoid adhesions. Abnormalities of the cerebral hemispheres are also often present in these cases.

2. If the hydrocephalus appears late (after the first three months) and develops slowly, it is likely that the Arnold-Chiari malformation present is small, and that the arachnoiditis set up is minimal. If aqueduct stenosis is present, it is not extreme.

3. If such a hydrocephalus undergoes spontaneous arrest (as is not uncommon), this is because the pulsatile thrust of the cerebro-spinal fluid circulation has canalized the obstructed subarachnoid spaces, so that a balance has been struck between the formation and the absorption of the cerebro-spinal fluid.

Treatment.

The treatment of progressive hydrocephalus in patients with sufficient remaining cortex is surgical.

When the cerebro-spinal fluid obstruction is due to a lesion that is accessible to direct surgical attack, this is the obvious method of treatment (for example, localized occlusion of the outlets of the fourth ventricle by congenital atresia or by post-inflammatory adhesions). However, in most cases the obstruction is inaccessible (for example, stenosis of the aqueduct of Sylvius), or too diffuse (for example, adhesions in the basal cisterns) to permit direct surgical attack, and either the rate of formation of the cerebro-spinal fluid must be reduced, or the excess cerebro-spinal fluid must be diverted.

Although the cerebro-spinal fluid is formed both by the choroid plexuses (by a process of secretion), and by a diffuse extrachoroid formation (by a process of filtration or diffusion), only the choroid plexus formation is important in the pathogenesis and treatment of hydrocephalus, as the extrachoroid formation occurs without the inexorable driving power behind it provided by the plexuses (Sweet, 1954).

Attempts to reduce the rate of formation of the cerebro-spinal fluid by the removal of the choroid plexuses of the lateral ventricles are not generally successful save in some very mild cases of hydrocephalus, so that the usual treatment is the diversion (or "shunting") of the cerebro-spinal fluid, either to bypass the obstruction, or to direct the excess fluid to the peritoneal cavity, there to be reabsorbed, or into the ureter to be excreted from the body.

Only those shunt operations usually performed and found satisfactory in this clinic will be described.

Short Shunts.

1. Ventriculo-cisternostomy (Torkildsen's operation). One end of a rubber catheter is inserted into a lateral ventricle through an occipital burr hole. After suboccipital craniectomy, the other end is then carried downwards between the skull and scalp to be placed within the *cisterna magna*.

2. Ventriculo-cervical shunt. This is a modification of Torkildsen's operation, used when the *cisterna magna* is of doubtful patency. Here, after a hemilaminectomy of the second and third cervical vertebræ, the lower end of the catheter is placed in the cervical subarachnoid space anterior to the upper cervical part of the spinal cord.

These two operations bypass inaccessible obstructions in the aqueduct of Sylvius or third ventricle.

3. Lumbar arachnoid-peritoneal shunts—(*a*) suprahepatic, (*b*) Fallopian tube. After a small second-lumbar laminectomy, one end of a small calibre plastic (polyethylene) tube is inserted into the lumbar subarachnoid reservoir of cerebro-spinal fluid. The other end is placed in the peritoneal cavity, in one of the two of the following places: (*a*) between the liver and the diaphragm, in the hope that the respiratory movements coupled with the absence of omentum in this region will minimize the risk of blockage of the tube; (*b*) into the Fallopian tube at its uterine end after this end has been severed from the uterus, so that fluid may drain out into the peritoneal cavity via the fimbriated end. In these two operations the cerebro-spinal fluid draining into the peritoneal cavity is reabsorbed and returned to the circulation.

4. Lumbar arachnoid-ureteral shunt. Here the distal end of the plastic tube is placed into a ureter after removal of the corresponding kidney. About 150 millilitres of cerebro-spinal fluid are then lost in the urine daily, and it is necessary to add two or three grammes of sodium chloride to the infant's diet each day.

In general, blockage of the tube (requiring revision) occurs more frequently in the peritoneal shunts than in the ureteric shunts, and more frequently in the suprahepatic peritoneal shunt than in the Fallopian tube shunt. However, in the peritoneal shunts there is no fluid or electrolyte disturbance, which is a frequent problem in the ureteric shunts.

Long Shunts.

There are two types of long shunt: (i) ventriculo-peritoneal shunt—(*a*) suprahepatic, (*b*) Fallopian tube; (ii) ventriculo-ureteral shunt. In these operations, a rubber catheter is led from a lateral ventricle through an occipital burr hole into a subcutaneous tunnel down the neck and back. At the lumbar level, this catheter is attached to a polyethylene tube, the lower end of which is inserted into the peritoneal cavity or ureter.

Selection of Operation.

Non-communicating Hydrocephalus due to Blockage of the Aqueduct of Sylvius.

This type of hydrocephalus is often called "obstructive". In older infants and in children, the obstruction is bypassed by Torkildsen's ventriculo-cisternostomy. In infants, aged under six months, because of associated obstruction in the basal cisterns and surface pathways, this operation is seldom successful, and for this group either a long shunt, or preferably two shorts shunts (a ventriculo-cervical shunt *plus* a lumbar arachnoid shunt) are carried out.

Non-communicating Hydrocephalus due to Obstruction of the Foramina of Luschka and Magendie.

A direct attack is made on the obstruction, the membranous wall of a posterior fossa cyst being removed, or inflammatory membranes or adhesions being excised. It is often found that relief of the obstructions occluding the outlets of the fourth ventricle has not given complete relief, as associated blockage is present in the basal cisterns and surface pathways. The hydrocephalus will thus have been converted into the communicating type, to be treated as in the next section.

Communicating Hydrocephalus.

A lumbar arachnoid peritoneal shunt is performed in the first instance, the Fallopian tube operation being chosen for girls and the suprahepatic operation for boys. If the tube becomes blocked early, or more than once, the shunt is converted into a lumbar-arachnoid-ureteric shunt.

Hydrocephalus Associated with the Arnold-Chiari Malformation.

When the hydrocephalus is present at birth, or develops shortly afterwards and is progressive in the first three months of life, no surgical treatment is recommended. The reasons are the severe nature of the Arnold-Chiari malformation and the consequent arachnoiditis, the associated cerebral malformations of aqueduct and hemispheres, the profound paraplegia, and the fact that most of these infants succumb early to infection. When the hydrocephalus appears after the third month of life, posterior fossa decompression and upper cervical laminectomy are performed to increase the space available for cerebro-spinal fluid to circulate upwards around the malformation. Arachnoid adhesions are freed, and an adequate opening into the fourth ventricle is established. If obstruction at the aqueduct of Sylvius is demonstrated by pre-operative air studies or at the time of surgical exploration, a ventriculo-cervical shunt is added. In cases in which this procedure is not sufficient to assist the hydrocephalus, and in which treatment is still considered desirable, there are three possibilities, as follows: (i) it may be possible to excise the meningomyelocele sac and at the same time to perform a lumbar-arachnoid-peritoneal shunt; or (ii) choroid plexectomy may be carried out; or (iii) a ventriculo-peritoneal shunt may be performed (a ureteric shunt is contra-indicated in the presence of a neurogenic and probably infected bladder).

Results of Treatment.

Until the development of shunt operations in which non-irritant plastic tubes were employed, the results of surgery in infantile hydrocephalus were depressingly poor.

On 1949 Cone reported on peritoneal shunts and Matson on the ureteric shunt, and a new era in treatment was begun. With the development of refinements in these techniques, with the proper selection of cases for operation and of the operation for the case, and with adequate subsequent supervision and revision operation if indicated, the results of treatment can be very good indeed. In general the medical profession has not yet realized this change, and it is for this reason that this paper has been presented. Writing of the lumbar-arachnoid-ureteric shunt, Matson (1956) stated that of over 100 children in whom this operation had been performed between 60% and 70% were alive, "and, what is much more important, with few exceptions those who survived are asymptomatic and developing well for periods from a few months up to over seven years. These are all children who had proved severe progressive hydrocephalus—children who would otherwise be dead or hopelessly damaged by this time".

When it is indicated, the results of ventriculo-cisternostomy (Torkildsen) in children aged over six months are very satisfactory. The long shunts used for non-communicating hydrocephalus are unsatisfactory from a long-term point of view, because of the necessity of lengthening the tube with the growth of the child—usually every twelve to eighteen months. The alternative use of two short shunts (upper and lower) is a recent and promising development. The best results are obtained in the treatment of communicating hydrocephalus by short lumbar-arachnoid shunts. No doubt many of these cases are caused by arachnoid adhesions resulting from birth haemorrhage or meningitis, and it is likely that, provided the brain is protected from further destruction, with the passage of time secondary pathways for the circulation of the cerebro-spinal fluid will develop, ultimately obviating the need for the shunt tube.

After operation, adequate supervision is essential in all cases in order that any blockage or slipping out of place of the shunt tube may be detected at an early stage, in which case a revision operation will usually give good results.

What of the future? Matson (1956) considers that the most promising fields of endeavour lie in the following two directions: (i) the improvement of the technical aspects of the peritoneal shunts so that revision will be unnecessary; (ii) the development of artificial valves to permit absolutely competent unidirectional flow of fluid from the lateral ventricles straight into the circulating blood-stream, no matter what the pressures in the ventricles or venous system may be. He states that this investigation of valves of small calibre has proceeded to the stage of considerable enthusiasm and cautious optimism.

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A GOITROGENIC FACTOR IN MILK.[1]

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AT the meeting of this association three years ago, I briefly reported some observations made in Tasmania, which led to the formation of the hypothesis that a significant amount of the goitre in Tasmania was due to the action of an unknown substance present in the milk of cows fed on chou-moellier, one of the Brassicæ.

This morning I want to present a summary of the results of the observations and investigations since then, to endeavour to reconcile this hypothesis with the theory that iodine deficiency is the cause of endemic goitre, and finally to consider the implications of our work for clinical pædiatrics.

Summary of Results.

Tasmania.

The laboratory and epidemiological investigations followed the analysis of the results of two goitre surveys of Tasmanian school-children, made at an interval of five years. In this interval a high percentage of school-children had been given, regularly each week, a tablet containing 10 milligrammes of potassium iodide. It had been expected that this procedure would significantly reduce the incidence of goitre, especially in young children, as had happened in Canberra several years previously (Clements, 1953). Instead of a reduction, there was a marked increase in the incidence in some districts, while in others a significant reduction had occurred. It was also noted that the age-sex distribution had changed, so that in children aged under 10 years the incidence was the same for each age group and for both sexes. This is in contrast to the usual finding in an area where the goitre is due to iodine deficiency—the incidence increases with age, and goitre is about four times more common in girls than in boys. Full details of these surveys have already been presented (Clements, 1955; Clements and Wishart, 1956). Epidemiological surveys had suggested that milk from cows fed on chou-moellier should be investigated. Laboratory tests demonstrated that three pints of milk, consumed in about half an hour, depressed the uptake of radioactive iodine in adult males in much the same manner as did the thiouracil group of drugs. It has subsequently been shown that the active principle is contained in a yellowish powder obtained by alcoholic extraction of skim milk and passage of the extract through an alumina column, with subsequent reextraction. This substance depressed the uptake of I^{131} in rats by amounts ranging from 55% to 80%. Unfortunately the active principle has not yet been isolated and identified.

In addition to chou-moellier being a source of this substance, there is good evidence that some of the cruciferous weeds, like swine cress, lesser swine cress and shepherd's purse, also produce a goitrogen in cow's milk.

For six years, from 1949 till the end of 1955, attempts were made to give all school-children in Tasmania one tablet a week containing 10 milligrammes of potassium iodide, usually on the same day each week. Although the distribution was known to be defective in some schools, it was, in general, satisfactory, and an analysis of the results from schools with good distribution and from those with poor distribution showed no marked difference. Despite this additional iodine, a significant number of children had developed a goitre after commencing school. It was decided to test the effect in one school, with a high incidence of goitre, of two tablets per week, one given on Monday and the other on Thursday. Urinary excretion tests suggest that this régime should maintain a satisfactory blood iodide level. This test was made at Huonville school during 1956. Approximately 50% of the children showed a reduction in size of the goitre, but four boys and eight girls developed a goitre despite the additional iodine, and in a number the goitre increased from being palpable to being visible. In the remainder there was no change in the size of the thyroid. It is noteworthy that all the children who had a well-developed visible goitre in 1954 still presented the same picture in September, 1956. The size had not been influenced by the additional iodide. A recheck of the distribution technique had verified that these children had received their tablets regularly.

While making the goitre survey in September, 1956, I joined Dr. Heather Gibson and a team of school nurses in making a survey of the sources of milk and the milk consumption of each child. This was done by calling on each mother. Of the 278 households visited, 141, or just over 50%, had their own cow; many of these animals grazed on open, weed-contaminated pastures. It was also found that a significant number of householders grew chou-moellier as a winter fodder for the cows. One dairy-farmer, who also distributed the milk, has pasture-improved paddocks free of weeds, and he does not feed chou-moellier. It was not possible to demonstrate any diffrence in the incidence of goitre between the children in households supplied by the various dairymen and those in households owning cows. Powdered milk alone was being used by 51 (18%) of the households visited. All the children in a number of families which had given their children powdered milk only from an early age had no thyroid enlargement. However, the numbers were too small to be significant. This survey also revealed that the majority of children consumed significant amounts of milk at home. Another observation reported by Dr. Heather Gibson, Principal Schools Medical Officer, is of interest. At the end of 1956 it was noted that there had been a marked increase in the incidence of goitre in the Snug and Margate schools between November, 1955, and November, 1956. Although both girls and boys were affected, the increase was more marked in the latter. By comparison, there had been little change in thyroid size in the children from November, 1954, to November, 1955. Dr. Gibson considers that the distribution of one tablet per week of potassium iodide had been effective in these schools, and in both years.

An episode in veterinary medicine in southern Tasmania in 1956 may offer an explanation for this sudden rise in the incidence in children. In the upper Derwent Valley in the winter and early spring last year there was a particularly heavy loss of lambs, occurring both as stillbirths and as neonatal deaths. The veterinary officers found that the majority of the deaths had occurred from gross enlargement of the thyroid, producing mechanical suffocation.

Last September I visited a number of these farms, and was able to verify that the goitres appeared to be associated with a large consumption by the ewes in the last four to six weeks of the pregnancy of a cruciferous weed known locally as "carrot weed". It was subsequently found that two species of weed were involved, the common crowsfoot (*Erodium cicutarium*) and long storkbill (*Erodium botrys*). Although these weeds grow widely in Tasmania, 1956 had been a year of unusually vigorous growth, due, it was thought by some agronomists, to the particularly humid autumn. In some paddocks onto which the first mobs of pregnant ewes had been released, this weed had been 10 to 12 inches high, completely covering the natural forage. The first mobs of pregnant ewes ate this crop down; the lambing losses reached 50% in these mobs. Later mobs released onto the same paddocks a month or so later found the cruciferous weeds eaten down, and in these mobs there were few losses.

Throughout southern Tasmania there was an extensive growth of cruciferous weeds in 1956. Although it was not possible to make a survey of farms and grazing lands in the Snug and Margate districts to determine the possible consumption of cruciferous weeds by milking cows, this seems a possible explanation for the abrupt rise in the incidence of goitre.

Queensland.

Endemic goitre occurs in southern Queensland. How extensive is the area affected is not known; but my investigations show that children in the Warwick district, and as far west as Milmerrin in the Darling Downs, have goitres. The age-sex distribution in these areas is interesting, particularly when a comparison is made with the Mackay district. In Warwick the incidence is almost identical in all age groups and both sexes, whereas in the Mackay district the incidence rises with age, and girls are affected about twice as frequently as boys. This is the pattern where there is an iodine deficiency.

Around Warwick there are about twelve small schools attended by children from nearby farms; a marked variation in the incidence of goitre was noted in these schools. In conjunction with the local agricultural officers, it was possible to establish a high correlation between the incidence of goitre and the

[1] Read at a meeting of the Australian Pædiatric Association, Canberra, March 30 to April 1, 1957.

extent to which dairy pastures were contaminated with turnip weed (*Rapistrum rugosum*). This weed, when eaten by cows, produces tainting of the milk and butter, and in the spring, when the growth is most luxuriant, much of the milk arriving at butter factories on the Darling Downs is unsuitable for use as liquid milk, or for the manufacture of first-grade butter. It is, however, drunk on the farms and in the hamlets. On the basis of the taint problem caused by a cruciferous weed, Sir Samuel Wadham had suggested that there might be goitre in the Warwick district, and so it turned out to be.

Samples of milk rated to be moderately heavily tainted were collected, and an alcoholic extract was prepared in the same way as for samples from Tasmania. These extracts depressed the uptake of I^{131} by the thyroid of rats by 80%, about the same as "Neo-mercazole" used in the controls. A series of experiments, designed to determine whether the mode of action of this substance on the thyroid was similar to that of thiocyanates, showed that it was not. These tests were made because earlier experiments on some of the substances responsible for the tainting of butter from the Darling Downs had yielded interesting results. Forss (1951) had shown that benzyl mercaptan, benzyl disulphide and benzyl isothiocyanate probably constituted the major causes of the taint in milk from cows feeding on a cruciferous weed, "lesser swine cress" (*Coronopus didymus*), which grows abundantly in the summer rainfall areas of New South Wales and southern Queensland. Tests with radioactive iodine had shown that benzyl mercaptan and benzyl disulphide had no effect on the uptake of I^{131} by the thyroid; on the other hand, benzyl isothiocyanate produced depression of 90% in the uptake of I^{131} on a dose of 0·01 millilitre.

The Relationship of This Hypothesis to the Iodine Deficiency Theory.

This hypothesis does not deny that much of the endemic goitre in the world is due to a deficiency of iodine in the foods eaten. Well-planned experiments in which additional iodine has been given have proved this. Our experiences in Canberra certainly confirm this, as does also the finding that in Tasmania, after five years of iodine prophylaxis, there had been a significant drop in the incidence of goitre in at least two districts. There seems little doubt that much of Tasmania is basically deficient in iodine. This hypothesis implies that superimposed on the iodine deficiency is a goitrogenic substance which operates more strongly in some areas than in others. The results of comparatively large prophylactic doses of iodine, approaching 20 times the weekly requirements, are conflicting; but these doses do seem to have reduced the incidence, but not spectacularly.

This hypothesis does offer an explanation for the "epidemics" of endemic goitre, and for the anomalies such as that reported from the New Plymouth district of New Zealand. In New Plymouth, prior to 1930, the district had been used as a goitre-free control area for the iodide content of soil and water and foodstuffs. Suddenly, in 1933, the incidence of goitre rose from 2% to 53%, but no changes were found in the iodide contents of soil, water or foodstuffs (Shore and Andrew, 1929; McCredy, 1933; Shore and Andrew, 1934). Brassicæ of all varieties had been grown around New Plymouth for a number of years prior to 1930, and although there does not appear to have been any change in the total acreages sown to the Brassicæ, there is no information about the relative amounts of each species (Smallfield).

Practical Applications in Paediatrics.

For many years it has been the practice to recommend additional iodide, especially for children and for expectant and nursing mothers, in recognized goitrous areas. The most common method of providing the additional iodine is through iodized salt. Since only free-flowing table salt has been iodized, the actual amount of additional iodine consumed by most people, especially children, has been small. How effective this method of prophylaxis has been is unknown, since follow-up surveys have seldom been made. In Canberra, extra iodine is now added to the salt used in bread-making, and it would be interesting to know whether there are any current figures of the incidence of goitre in this city.

I am, in this section, more concerned with the procedures that may be followed by the doctor when presented with a child with a symmetrical, uniform enlargement of the thyroid, and the information that the child comes from a goitrous area. The common practice is to prescribe iodine, on the presumption that the goitre is the result of iodine deficiency, and that the administration of iodine should reduce the goitre.

Some years ago in Canberra we gave a large group of pre-adolescent and adolescent girls, with well marked goitres, one tablet containing 10 milligrammes of potassium iodide twice weekly, and another group placebos. These girls were followed for two years. Although the size of the thyroid was reduced in a few girls in the group receiving iodide, in no girl did the goitre disappear, and the differences were not statistically significant. Added to this is the experience of practitioners in goitrous areas, especially in Tasmania, who have personally reported the same story in their young patients.

In contrast to this is the experience of Greer and Astwood (1953), who treated simple goitre with thyroid in doses of 2 or 3 grains daily, with a range of 0·5 grain to 6 grains. They found that, except when a nodule was present, the goitre disappeared; age was not a factor affecting the results. The patients were followed at regular intervals, and no untoward effects of the thyroid medication were noted. In only two instances did the goitre return after treatment. The mechanism by which the thyroid operates is easily recognized. The exogenous hormone depresses the thyrotropin of the pituitary, and the thyroid undergoes involution. These authors considered that thyroid was a specific for simple goitre, whatever the aetiology.

For many years Dr. Terence Butler, in Hobart, has been successfully treating simple goitres with thyroid, having found iodide medication of no value. If a significant amount of the goitre around Hobart is due to the action of a goitrogenic substance, other than iodine deficiency, Dr. Butler's experience is not surprising.

The paper by Greer and Astwood makes interesting reading, for they review the early history of the treatment of simple goitre. From 1890 to 1900 various preparations of thyroid were used extensively, with great success for simple goitre. By 1900 the idea was losing favour because of the high percentage of recurrences and the low percentage of successes—due, apparently, to the poor quality of many of the preparations on the market.

These several experiences raise the question whether thyroid is not to be preferred to iodide in the treatment of the simple endemic goitre.

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PROBLEMS OF CHILDREN IN A LONG-STAY HOSPITAL.[1]

By DOUGLAS GALBRAITH,
Melbourne.

PAEDIATRICIANS today need no elaboration by me of the problems arising from admission of children to hospital. Many authorities, including Grover F. Powers (1948), James Spence (1951), Bowlby (1951) and Bakwin (1951), have provided a full text. "The Child in Hospital" (1955), an account of a meeting of a study group sponsored by the World Health Organization

[1] Read at a meeting of the Australian Paediatric Association Canberra, March 30 to April 1, 1957.

and Swedish authorities, is well worth study, as is that splendid talk "People in Hospital" by Felix Arden (1956).

What I am going to try to do today is to set out the practical measures we have found of value at one long-stay hospital, the Orthopædic Section at Frankston of the Royal Children's Hospital, Melbourne. Time limits will ensure that this is a thumb-nail sketch—on quite a small thumb.

The nub of this matter is that a hospital is an abnormal environment for any child, particularly for a small child, and that the separation from the family unit submits children to undue strains. If this is so for an admission lasting but a few days, how much more marked it is when the stay and separation may extend to many months—and what can one do about it? Let us set out our points in orderly fashion.

The Preparation of Parents and Child for Admission to Hospital.

Dr. Vernon Collins, Medical Director of the Royal Children's Hospital, long ago initiated the routine of sending a memorandum to parents whose child was to be admitted to that hospital This gives simple information, and emphasizes that the parents should tell their child about the admission to hospital and should be truthful and honest with him.

For admissions to the Orthopædic Section, a letter personally signed by me goes to each parent when the child is admitted. It tells them something over the hospital and seeks their cooperation. With it is a short *questionnaire*, which asks for information about simple things such as the child's nickname and his likes and dislikes.

The Admission Procedure.

Parents are encouraged to accompany small children in the ambulance from the parent hospital to Frankston, meet the ward sister and settle the child into bed. If he is ambulatory, he is taken for an exploration of the hospital. The bringing of a favourite doll or toy or book is encouraged. The reception area at the hospital has been made bright with flowers, and there is a general conspiracy of cheerfulness by all members of the staff. As it happens, the midday meal is served almost immediately after the child's arrival.

The Value of the Kindergarten Centre.

It would be hard to over-estimate the importance of the kindergarten centre. Small children are taken to it within a few hours of arrival. There, with its gay flowers and bright colours, its variety of toys and—most important—its water-tap and sand-pit, the small child picks up normal contact with the pleasant things of childhood. It is immensely interesting and moving to watch the small, serious face brighten with interest and pleasure.

The Value of Occupational Therapy.

For the older child, the occupational therapy department plays much the same part as "kinder" does for the young child. Interest is aroused and fingers itch to achieve. In addition to usual occupational therapy activities, evening bedside classes in photography and carpentry have been a successful innovation.

Education.

The fact that the hospital is a State school ensures continuity of education up to intermediate and school leaving standard. The Red Cross library provides an important service. Regular religious instruction for all denominations is a considerable help, and we are fortunate in having our small but inspiring chapel.

Companionship.

Even small children like to have a "cobber", and we have found it important not to change a child's position in the ward. He or she soon pals up with the next child, and there is great sorrow should they be moved. Another small point is the celebration of each child's birthday with a real party, the other children helping in the organizing. Hospital troops of Brownies and Girl Guides, Wolf Cubs and Boy Scouts assist in the project of companionship.

Visiting.

Until a few years ago, visiting was limited to Sunday afternoons and to adults. Now visiting both by adults and by children is unrestricted. This "family unit" visiting is, I am sure, most important. Children miss their brothers and sisters just as they miss their parents. We try to give them some privacy as a family unit, and this they appreciate. Strangely enough, we have had less infection in the wards than in the days of restricted visiting by adults only.

We are fortunate, too, in having a group of women who come to visit children who for one reason or another do not have visits from members of their family. These women act as foster-parents, knit and sew garments, write letters, and take an interest in the children even after they leave hospital.

Cooperation with Parents.

A basic principle in the hospital has been to try to explain to the parents as clearly as possible, showing X-ray films when necessary, the nature of their child's disability, just what we are trying to achieve and, in the case of operation, what the procedure will be. This policy has paid dividends. We have, too, a Parents' Association, which brings forward to us any general problems of parents, and which has also raised approximately £70,000 during the seventeen years of its existence.

We encourage parents to spend at least one day in the hospital before their child goes home. They see the daily routine, talk with the ward staff, are shown in detail any physiotherapeutic procedure, and are made to feel that they are indeed taking an active part in their child's recovery.

Staff Discussions.

At regular intervals there are group discussions on certain children whose names are suggested by the nursing staff. Present are nurses, school-teachers, physiotherapists, occupational therapists, social workers and doctors. Each child's special problems are worked out as information is pooled. To me these discussions, at which the doctors are mainly listeners, have proved of great value.

Operations.

So far as is possible, the child is told the reason for any operation or immobilization in splints or plaster. With the use of adequate sedation and of "Pentothal", the dread of the anæsthetic has been largely removed. The staff never use the term "operating theatre" to the patient, but speak of "the treatment block".

Ward Routine.

An attempt has been made to simplify or eliminate certain routine ward procedures, so that the nursing staff have more time to talk to the children or read them stories and to pick up and "mother" the small children. We can take it as axiomatic that every child in hospital is lonely. The more we realize this—and in our professional diagnostic and therapeutic zeal we can easily overlook it—the more successful we shall be in helping our child patients.

Then there is the question of "blowing off steam". All children want to do this, and for our children, cribbed and confined in splints, the necessity is imperative. So for parts of the day we like to hear a noisy ward and are suspicious of a quiet one. The sea-water swimming-pool is a wonderful place for dissipating surplus muscular and vocal energy.

As an example of the problem of "rules and regulations", I shall mention smoking. Our bigger boys used to smoke surreptitiously in bathrooms, in lavatories and even under the bed clothes. So a daily "smoke-oh" period was instituted and, the novelty having worn off, nobody now wants to smoke.

Reorientation of the Child on Leaving Hospital.

The need for reorientation of the child leaving hospital is perhaps the least recognized of all problems of hospitalization. Yet it can be a source of great unhappiness to parents. Children for weeks after their discharge will complain to their mother, "That is not the way nurse used to wash me", or "That is not the kind of dinner I had in hospital". They may be moody and cantankerous, and it is hard for parents to realize, unless it is explained to them, that this is a natural process. But it is an added reason for the parents to see the hospital routine, and so to be accepted by their child as "knowing what Sister did".

Summary.

Our basic conception is that children should not be admitted to a "long-stay" hospital unless this is really necessary. If they are admitted, our job is, as Quibell (1954) had said, "to

get the child well as quickly as possible, both physically and mentally, and meantime to foster the use of mind and hands and to promote their development of character". It is contended that with interested and intelligent staff using common-sense rules, the psychological damage done to children in hospital can be greatly lessened; in fact, many children gain quite a good deal in hospital from the affection given to them by devoted nurses and other staff members, and from the cheerful companionship of other disabled children.

Acknowledgements.

Finally, I want to pay tribute to the great assistance given in these matters by our Matron, Miss Sophie Brodie, and by many members of the professional and general staff of the hospital.

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THE CHANGING FACE OF OSTEOMYELITIS IN CHILDREN.[1]

By DAVID L. DEY,
Sydney.

TEN years ago most surgeons would have said that their patients with acute hæmatogenous osteomyelitis did well. Recently, we at the Royal Alexandra Hospital for Children have been increasingly unhappy about these cases, and the present survey gives substance to this uneasiness.

Material.

The available records of all cases classified as osteomyelitis during the years 1945 to 1956 inclusive were examined. In 1945 penicillin had come into general use in the hospital, but in 1944 the records showed that many patients had been treated with sulphonamides alone, so that this was used as a starting point. After elimination of those patients who reached the hospital too late for treatment there to have influenced the immediate outcome of their disease, there remained 266, and their papers were scutinized more closely. The number of "chronic" rejected cases represented almost an equal number, being made up of our recurrent hospital cases, or admissions of patients from other sources already past the early acute phase.

It has been regarded as proof of the diagnosis if one of the following criteria was present: (i) a subperiosteal abscess proved at operation; (ii) a bony sequestrum; (iii) radiographic bony changes typical of osteomyelitis; (iv) a positive blood culture in the presence of a suggestive clinical picture. In the absence of these, the diagnosis rested upon clinical grounds only. Sixty-three, or almost exactly one-quarter of the total number, belonged to this "unproven" group. These 63 patients all did well, mostly with penicillin therapy alone, or the diagnosis would have been more certainly established.

Methods of Treatment.

Generally speaking, the following routine of treatment has been followed in the hospital over the greater part of the period under review: (i) A sample of blood has been taken on the patient's admission. (ii) The surgeon concerned has been notified. (iii) Antibiotic therapy has been instituted.

Early indications for operation have been largely as follows: (*a*) Failure of response in spite of an increase in the dosage of the chosen antibiotic, or of a change in antibiotic when lack of sensitivity was suspected; (*b*) systemic response without resolution of local signs; (*c*) the development of a subperiosteal abscess on about the fourth day from the onset of the illness which has mostly been regarded as the earliest time at which such an abscess was likely to be present.

At that stage, operation consisted of evacuation of the abscess or actual insertion of a drain, and in few cases was the bone drilled. There appears no reason to regret this failure to drill, and in at least one case the bone became infected from a soft-tissue focus as a result of drilling.

Later, operation was performed for recurrent infection, for the presence of chronic sinuses, and for radiographic evidence of sequestration. This type of operation aims at the removal of a loose piece, and is likely to fail if much interference with the bone proves necessary.

In no instances in the age group considered did the provision of proper skin cover appear as an indication for operation. I should like to underline the fact that the decision to operate has now become a matter of such nice judgement that no patient should be treated other than in hospital and under the daily care of the surgeon concerned. It would seem that with the rise of organisms resistant to antibiotics, surgery will play a more and more important part, particularly in certain sites, and any delay due to lack of liaison between physician and surgeon must be avoided.

Details of the Survey.

The details of the survey are shown in Table I. The period is one of twelve years, and it will be seen that this consists of three four-year periods. In the first period (1945 to 1948), the numbers of admissions are approximately one-half of those in the second (1949 to 1952), and one-third of those in the third (1953 to 1956). The reason for this increase in admissions for acute osteomyelitis is not clear. I do not believe it to be due to more complete recovery of records in recent years; but it is possible that outside practitioners have been less willing to attempt treatment of these patients in the acute phase. However, I must stress that there is no proof of this, or any other indication of the cause. In each year the "unproven" cases are nearly one-quarter of the actual admissions.

The next section contains the most significant findings of the survey. Organisms have been isolated in about half the cases. Sensitivity test were not widely performed until 1951; in that year and the next two there were respectively one, two and three organisms insensitive to penicillin. However, in 1954 there were equal numbers of sensitive and insensitive organisms. In 1955 the insensitive organisms outnumbered the sensitive organisms by 12 to 9, and in 1956 by 11 to 5. In other words, in the last year 68·8% of the organisms isolated were shown to be insensitive to penicillin. It has therefore become dangerous in the extreme to treat early osteomyelitis with penicillin. Opinion seems to favour the initial use of a combination of drugs. In my own experience I have not been impressed with the results obtained by the use of streptomycin alone or in combination with penicillin. Theoretically, the combination of a bactericidal and a bacteriostatic drug would appear ideal; but this does not seem to have been employed very much in this hospital. The number of organisms isolated in blood culture or from a subperiosteal abscess (hence, not "hospital" organisms) which were insensitive to antibiotics other than penicillin was negligible—only one or two in the whole series, and then to different drugs. Hence, as staphylococcal resistance to "Chloromycetin" is acknowledged to be rare, it would seem wise to use this in conjunction with, say, erythromycin in high dosage. Should a penicillin-sensitive organism be recovered, it would then be allowable to use penicillin after the first week for continuance of the dosage for the necessary three or four weeks' safety period.

It is not possible, in the absence of follow-up records, to be precise about the final results of the treatment of these patients. However, I would venture the opinion that very few of them have any residual infection at this time. Most of the patients who were readmitted to hospital appeared to have been stabilized at the time of their last discharge. No evidence is available to me of the occurrence of interference with or stimulation of bone growth. The death rate is also low—two deaths in 226. One was that of a baby, aged four weeks, who had multiple foci in both legs, one arm and the skull. The other was that of a boy, aged four years, whose lesion was in the iliac crest, and who was found to have pyæmic lesions in his lungs *post mortem*. He was ill for only two days before his admission to the Royal Alexandra Hospital for Children, where he was treated for forty-eight hours with penicillin before a blood culture showed an organism insensitive to this antibiotic. He died one day later.

[1] Read at a meeting of the Australian Paediatric Association, Canberra, March 30 to April 1, 1957.

TABLE I.

Royal Alexandra Hospital for Children: Survey of Osteomyelitis Records, 1945 to 1956.

Observation.	1945.	1946.	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	Total.
Number of "acute" admissions	7	14	10	11	25	26	23	17	35	34	38	26	266
Number depending upon clinical diagnosis only	1	6	2	1	6	7	3	5	6	10	10	6	63
Cases in which organisms were isolated:	2	4	5	7	10	14	11	6	17	15	21	17	129
(*a*) "Positive" blood culture	—	—	—	3	8	4	6	1	3	7	9	8	—
(*b*) Organism sensitive to penicillin	—	(1)	(1)	(2)	(1)	(2)	10	4	14	*8*	*9*	*5*	—
(*c*) Organism insensitive to penicillin	—	—	—	—	—	—	1	2	3	7	*12*	*11*	—
Deaths	—		—	—	—	—	—	—	—	—	2[1]	—	—
Operations (number of patients): (*a*) Drainage of abscess ..	1	4	3	5	2	10	9	6	15	9	14	5	83
(*b*) Sequestrectomy	2	—	1	1	2	—	1	1	1	4	5	9	27
(*c*) Curettage of sinus ..	—	—	—	—	—	1	—	—	—	—	—	1	2
(*d*) "Negative" exploration	—	—	—	2	—	—	—	—	2	1	—	—	—
Total operations (*less* (*d*))	3	4	4	6	4	11	10	7	16	13	19	15	112
Average initial period in hospital (months)	8	1½	2	4	1	1½	1½	1	2	1½	1½	2½	—
Number of first admissions more than three months ..	2	1	2	6	—	1	1	0	2	3	10	8	—
Number of patients requiring readmission	2	1	1	1	3	3	4	2	7	7	7	7	45
Number with involvement of upper end of femur ..	3	1	1	1	1	6	4	4	10	7	12	6	56
Clinical diagnosis only ..	—	—	1	—	—	—	4	4	5	4	4	2	24
Severe cases	3[2]	—	—	—	—	—	—	—	3[3]	4[4]	1[5]	1[6]	12
Infants	1	—	3	1	2	4	—	3	5	8	6	2	35
Severe infections	—	—	—	—	—	—	—	—	Multiple lesions, 2	Multiple lesions, 2	2[7]	2[8]	—

[1] One of these two deaths was that of an infant, aged six days, and may be more fairly described as a case of staphylococcal infection of the new-born. The other was that of a boy, aged four years, who had involvement of his iliac crest. At the post-mortem examination he had evidence of small lung abscesses; but death appeared to be due to toxæmia rather than to any specific lesion.

[2] Loss of femoral head, 2; partial dislocation, 1.

[3] Sinuses, *etc.*

[4] Loss of femoral head, 1; pathological fracture of neck, 1; sinuses, 2.

[5] Sequestrum.

[6] Loss of femoral head.

[7] One died, one chronic disease.

[8] Chronic.

Operations have been performed in about half the cases. This relationship has been constant, except for a very noticeable drop in 1949. The reason for this is not clear; but it may be that too conservative an attitude was adopted in this year, or that penicillin therapy was still most effective at this time.

Table I also shows that the average stay in hospital has not varied greatly, but that there has been an increase in long-term cases (stay more than three months) and also in the number of patients requiring readmission to hospital in recent years.

The survey has confirmed a clinical impression that in many instances infection of the upper end of the femur means a bad result. In five instances the head has been lost, in one other a pathological fracture of the neck occurred, and in a further five the results were poor—a total of 11 in 56 instances. The difficulties in diagnosis in this region are combined with a precarious blood supply of the femoral head, and it seems likely that early drainage is even more imperative in this region than elsewhere.

Conclusion.

In conclusion, I would say that, although overall results up to the present time remain reasonably satisfactory, the following points in treatment must be observed:

1. The use of penicillin as initial treatment before the organism is isolated must be abandoned.

2. Treatment in hospital and daily observation are essential in the acute phase.

3. Early drainage of any abscess is advisable, and this is especially so in the case of the upper end of the femur.

HYPONATRÆMIA AND CENTRAL NERVOUS SYSTEM DISEASE.[1]

By DONALD B. CHEEK, M.D., D.Sc.,

Department of Pathology, Royal Children's Hospital, Melbourne.

DISEASE of the central nervous system may be accompanied by disturbances of fluid and electrolyte balance. Improved results in the treatment of meningeal infections with chemotherapeutic agents have allowed a more accurate assessment of these complications, and their study emphasizes the importance of early recognition and treatment.

This communication deals with the association of hyponatræmia and hypochloræmia with disease of the central nervous system. Changes in concentration reflected in blood electrolyte determinations rarely occur without changes in volume. Volume changes are shown to occur in this group of diseases (Figure I).

It is possible that the following three variants in electrolyte and fluid disturbance occur in disease of the central nervous system: (i) hyponatræmia and hypochloræmia, with increase in the volume of extracellular fluid; (ii) hyponatræmia with increase in the intracellular fluid volume (water intoxication); (iii) hyponatræmia with decrease in the extracellular volume (true salt depletion). The study of tuberculous meningitis will illustrate the first, and perhaps occasionally the second, type of change.

[1] Read at a meeting of the Australian Paediatric Association, Canberra March 30 to April 1, 1957.

Tuberculous Meningitis.

Patients with tuberculous meningitis, even when vomiting is minimal or absent, often present abnormal levels of electrolytes in the peripheral blood.

In Table I are shown (Cheek, 1954, 1956) the results of serum electrolyte determinations on a group of patients with tuberculous meningitis, all of whom were unconscious at the time when the blood was taken. These results clearly indicate a state of metabolic alkalosis. Sodium and chloride concentrations are low or fall within a few days of the patient's admission to hospital, the carbon dioxide content (HCO_3 and dissolved CO_2) is high and the hydrogen ion concentration of the blood is on the alkaline side. These changes are found most strikingly in the unconscious patient.

that sodium was distributed over an expanded volume. In these patients the use of a reliable technique for estimation of extracellular volume shows that this parameter is increased, and the total body chloride content is found to be normal or increased. Osmolarity of the extracellular fluid is reduced, and the alteration in chemical composition is referred to as hypotonic expansion of the extracellular fluid.

In tuberculous meningitis the total body chloride content is normal or increased, and in the presence of metabolic alkalosis the total body sodium content is probably increased, for in metabolic alkalosis there is an increase of sodium relative to chloride. Metabolic alkalosis leads to a loss of potassium through the kidney; this further emphasizes the care to be taken in avoiding excessive sodium loading in these patients.

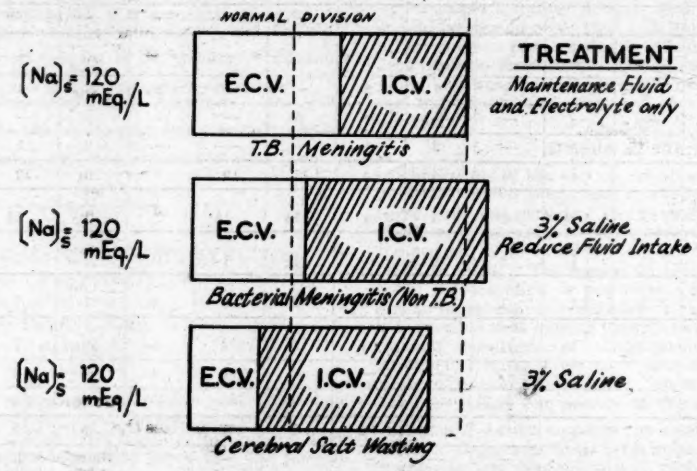

FIGURE I.

Central nervous system disease with hyponatræmia. Extracellular and intracellular volume (diagrammatic).

Clinically there is no evidence of salt depletion. Hæmoconcentration is absent, and no clinical improvement results from the infusion of isotonic or hypertonic saline. Infusion of saline not only fails to elevate or sustain sodium concentration, but is deleterious to the patient.

TABLE I.

Serum Electrolyte Concentrations in Patients with Tuberculous Meningitis.

Subjects.	Age. (Yrs.)	Electrolyte. (Milliequivalents per Litre.)				pH.
		Sodium.	Chloride.	Potassium.	Carbon Dioxide.	
Normal	—	145	105	5·0	24·0	7·35 to 7·45
Tuberculous meningitis:						
A.	7	125	85	3·0	32·0	7·60
B.	8/12	125	74	3·9	38·1	7·45
C.	3	130	96	4·2	28·6	7·41
D.	5/12	120	91	5·4	27·5	7·44
E.	3	103	62	4·1	23·5	7·50
F.	3	128	80	2·6	30·2	7·50
G.	3	124	84	2·8	28·0	7·50
H.	5	121	83	4·2	20·5	7·50
I.	8	130	93	4·6	23·0	7·47

At this stage it is emphasized that, while the serum sodium concentration is abnormally low, the total body sodium content is not similarly affected. Thus, when one is presented with hyponatræmia, if other data indicate that extracellular volume is significantly high, it does not follow that the total body sodium content will be low. Indeed, such findings would indicate Harrison *et alii* (1952) have demonstrated losses of muscle potassium in patients with tuberculous meningitis.

The total body water content in tuberculous meningitis may be normal, low or high. When it is normal or low, any expansion of the extracellular fluid must be at the expense of cell volume (see Figure I). In some patients, the total body water content is high in proportion to body weight. These patients rapidly go into negative nitrogen balance and lose fat and body protein. In the malnourished subject, the total water content is disproportionately high when considered on a body-weight basis. In the normal subject, total water makes up 73% of the fat-free body weight. Three patients had a total water content of 80% of their body weight. With such a finding the possibility of water intoxication cannot be excluded entirely; but on repeated occasions it has not been possible to demonstrate an inability to establish a water diuresis.

Maintenance doses of fluid and sodium chloride are indicated, while additional potassium therapy over and above maintenance potassium requirements would seem advisable; but no indications for hypertonic saline or other solution of high sodium content are presented.

While the changes in serum chemistry are constant and of interest, the pathologist for many years has been concerned with the lowering of the spinal fluid chloride concentration. The present findings offer one means of explanation for this phenomenon. There is in tuberculous meningitis a gross abnormality of the blood-brain barrier with respect to the passage of ions (Taylor *et alii*, 1954). Usually ions such as bromide or Cl^{36} or Cl^{38} take days to penetrate completely from the serum to the spinal fluid. In tuberculous meningitis, less than five hours are required for the complete passage of bromide (Cheek, 1956). It is possible that the time required is much less than five hours. In one case of tuberculous meningitis, in which spinal fluid was drawn only two and a half hours after bromide infusion, the plasma and spinal fluid levels

had already reached similar figures. The concentration of chloride is low in all phases of the extracellular fluid in tuberculous meningitis. Hence, because of the increased permeability of the blood-brain barrier, the spinal fluid chloride level could equilibrate with the low level of chloride in other phases such as plasma and intestinal fluid. The fall in spinal fluid chloride level presumably does not result from a loss of body chloride. The abnormality of the blood-brain barrier is associated with inflammation of the central nervous system.

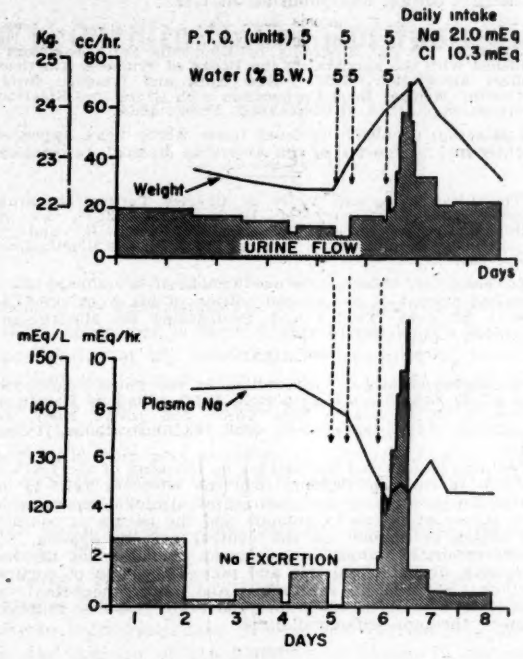

FIGURE II.

Effect of water loading and pitressin on electrolyte excretion in dogs. Note that with progressive loads of water (5% of body weight) there occur a marked reduction of the serum sodium concentration and a significant gain in weight, then finally a sudden increase in urine flow and salt excretion. The salt loss is of sufficient magnitude to render the animal subsequently salt-depleted.

Encephalitis or Bacterial Meningitis.

In encephalitis or bacterial meningitis, other than tuberculous, hyponatræmia and hypochloræmia can also arise. Unlike tuberculous meningitis, these findings are inconstant. Nyhan and Cooke (1956) have recently reported five cases of bacterial or viral meningitis in which hyponatræmia was present. They believed their patients to be suffering from the added complication of water intoxication. These workers were not able to detect appreciable losses of sodium by balance study, but deduced that there was a retention of water even when the maintenance administration of fluid was reduced to minimal requirements. Symptoms of water intoxication and repeated convulsions were dramatically relieved by the use of hypertonic or 3% saline.

McCrory and Macaulay (1956) have reported hyponatræmia and water intoxication in a patient with brain damage. They demonstrated an increased level of antidiuretic hormone in the plasma. During the progress of earlier work (Cheek, 1954), a patient with meningococcal meningitis was found to have hyponatræmia and hypochloræmia. As the result of the measurement of the total water and the chloride space, a state of increased cell hydration was demonstrated. Nyhan and Cooke (1956) have suggested that inflammation at the base of the brain may affect the supraoptic nuclei or other regions concerned with the liberation of antidiuretic hormone. These workers also emphasized that there seemed to be no significant negative sodium chloride balance in their patients. It has been my experience to find a diminished extracellular volume in some patients with influenzal, pneumococcal and meningococcal meningitis.

Water Intoxication.

In experiments on water intoxication in which dogs were used, three water loads of 5% body weight were administered by stomach tube at approximately twelve-hour intervals (Cheek and West, 1956), and antidiuresis was maintained by the intramuscular injection of pitressin; an increase of 10% of body weight could be attained. While the serum sodium and chloride concentrations fell progressively, the water loads were distributed according to the situation of body solute (60% to the cells, 40% to the extracellular fluid); after the last water load there occurred an abrupt natriuresis and chloruresis (Figure II). The urinary salt excretion was in some animals so great that a state of salt depletion resulted. Recent observations suggest that expansion of extracellular volume will prevent the release of aldosterone (Bartter *et alii*, 1956), which in turn will favour the excretion of body sodium. Hence, a close relation possibly exists between water intoxication and salt depletion. The changes in volume are represented diagrammatically in Figure I.

Cerebral Salt Wasting.

The condition of "cerebral salt wasting" was described by Peters *et alii* (1950). After head injury, cerebral vascular accident or tumour of the fourth ventricle, renal salt excretion may increase progressively. Again, hyponatræmia arises. However, dehydration, hæmoconcentration, azotæmia and loss of skin turgor also develop and in the words of Higgins *et alii* (1954), "it was almost as if they had Addison's disease". This is, of course, a true state of salt depletion, with a reduction of extracellular volume and a relative increase in cellular fluid. It would seem that there is a certain region of the brain, as yet undefined, which exerts an influence on sodium metabolism.

Conclusion.

Figure I summarizes the changes in volume and the treatment indicated for disease of the central nervous system complicated by hyponatræmia.

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Reviews.

Practical Pediatric Dermatology. By Morris Leider, M.D.; 1956. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 10" x 6¾", pp. 433, with 280 photographs and 13 drawings. Price: £5 15s. 6d.

THE objective of this book, as stated by M. B. Sulzberger in the foreword, is to assemble and impart to medical students, general practitioners, pædiatricians and, indeed, even to experienced dermatologists, practical information, well buttressed by sound theory. This objective is partly achieved by a well written and fairly well edited book.

There are 14 chapters well supplied with black and white photographs. Chapter III contains an annotated formulary of 101 useful topical applications, printed on blue paper and readily accessible by contrast with the white paper of the main text. The quality of the paper throughout is exceptionally good.

The usual end-of-the-chapter bibliography is omitted, and the author's reasons for the omission are acceptable. The foreword by Marion B. Sulzberger and the preface by the author merit more attention than one usually accords such inclusions. The estimate of the incidence of skin diseases in general and institutional practice as 10% to 20% is probably much higher than Australian estimates (5% to 10%).

More emphasis than usual is placed on the art and science of nursing and medicating the skin, and the established principles and types of medication, which still hold their own against some of the newer and fancier modern preparations, are stressed. It is commendable that the author is not prepared to follow the older leads of incriminating foodstuffs and allergic processes as the cause of many dermatoses except in the case of acute urticaria. He firmly believes that diet juggling, elimination diets and restriction of various foods are not of great importance in treatment. This belief is consistent with his earlier statement that the book is meant to be a practical one and not a mere mass of uncritically copied facts. However, psychosomatic factors in the origin of dermatoses cannot be dismissed as summarily as he believes. The influence of psychic factors in precipitating the first appearance of such states as infantile eczema is undoubted, although the eczema may be basically due to other constitutional factors.

Chapter I, which deals with anatomy, physiology and biochemistry of the skin and gives a glossary of word meanings, is probably the best chapter in the book. However, the first chapter of any text-book is probably the easiest to write. The chapters on diagnosis (Chapter II) and the principles of treatment (Chapter III) are very good and well supplied with useful tables.

The author is awake to the potential danger of local application of antihistaminics to the broken skin.

In summary, this book is one which can be recommended to the dermatologist. Most of it is not suitable for the undergraduate or for the busy general practitioner. There are smaller and better text-books for the latter two groups, and the number of typographical errors in this book is a source of disappointment. The pædiatrician would find it useful as a reference book.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Angry Young Doctor", by Louis Goldman; 1957. London: Hamish Hamilton. 7¼" × 5", pp. 128. Price: 8s. 6d. (Australian).

A commentary on the National Health Service in Britain.

"Particulate Clouds: Dusts, Smokes and Mists: Their Physics and Physical Chemistry and Industrial and Environmental Aspects", by H. L. Green, M.A. (Cantab.), F.Inst.P., and W. R. Lane, B.Sc. (Birm.), F.Inst.P.; 1957. London: E. and F. N. Spon, Limited. 9¼" × 6", pp. 445, with illustrations and plates. Price: £3 10s.

The title is self-explanatory.

"Cryptorchism", by Charles W. Charny, M.D., and William Wolgin, M.D.; 1957. New York: Paul B. Hoeber, Incorporated. 9¼" × 6", pp. 152, with 28 illustrations. Price: $5.85.

"A complete review of the subject which arrives at conclusions based on testicular biopsy and includes a clear guide to management of the boy with cryptorchism."

"The Reticular Formation of the Brain Stem, Anatomical Aspects and Functional Correlations", by Alf Brodal, M.D.; 1957. Edinburgh and London: Oliver and Boyd for The William Ramsay Henderson Trust. 9¼" × 7¼", pp. 96, with 23 illustrations (including five plates). Price: 21s. 9d.

The essence of this publication was presented as two lectures under the auspices of the William Ramsay Henderson Trust at the University of Edinburgh in May, 1956.

"The Electrocardiogram: Its Interpretation and Clinical Application", by Louis H. Sigler, M.D., F.A.C.P., F.C.C.P., F.A.C.C.; Second Edition; 1957. New York and London: Grune and Stratton. 9" × 6", pp. 328, with 195 illustrations. Price: $8.75.

Extensively revised since the publication of the first edition in 1944.

"St. Vincent's Hospital Pharmacopœia"; Third (Centenary) Edition; 1957. Sydney, London, Melbourne and Wellington: Angus and Robertson. 6¾" × 4¼", pp. 224. Price: 25s.

The first edition was published in 1942.

"J.A.M.A. Clinical Abstracts of Diagnosis and Treatment", published with the approval of the Board of Trustees, American Medical Association; 1957. New York and London: Intercontinental Medical Book Corporation with Grune and Stratton, Incorporated. 8½" × 5½", pp. 566. Price: $5.50.

A selection of abstracts from those which have appeared recently in *The Journal of the American Medical Association*.

"The Life, Work and Times of Charles Turner Thackrah, Surgeon and Apothecary of Leeds (1795-1833)", by A. Meiklejohn; 1957. Edinburgh and London: E. and S. Livingstone, Limited. 8¾" × 5½", pp. 244, with five illustrations. Price: 25s.

An essay on Charles Turner Thackrah accompanying a complete reprint of the second edition of his work on "The Effects of Arts, Trades and Professions on Health and Longevity" published in 1832.

"Neuropharmacology: Transactions of the Third Conference, May 21, 22 and 23, 1956, Princeton, N.J.", edited by Harold A. Abramson, M.D.; 1957. New York: The Josiah Macy, Jr. Foundation. 9" × 6", pp. 384, with 133 illustrations. Price: $4.50.

Contains papers and discussions on blocking of the LSD-25 reaction in Siamese fighting fish, the effect of LSD-25 on snails, the production and control of alcoholic cravings in rats, stress situations in animals and the nature of conflict, the action of alcohol on the central nervous system, the measurement of subjective responses, the effect of psychosomimetic drugs in animals and men, the origin of cortical surface potentials, serotonin and norepinephrine as antagonistic chemical mediators and brain response to drugs mapped through self-stimulation.

"A Guide to Blood Tranfusion", by R. J. Walsh and H. K. Ward; 1957. Sydney: Australian Red Cross Society (N.S.W. Division) Blood Tranfusion Service. 8¼" × 5¼", pp. 164, with 27 illustrations. Price: 20s. Australian.

Designed for the medical student, the general practitioner and specialists in fields other than that of blood transfusion.

"Obesity: Its Cause, Classification and Care", by E. Philip Gelvin, M.D., F.A.C.P., and Thomas H. McGavack, M.D., F.A.C.P.; 1957. New York: Paul B. Hoeber. 8" × 5¼", pp. 160, with six illustrations. Price: $3.50.

The authors have attempted to present a practical programme for the management of obesity based on personal experience at the Obesity Clinic at Metropolitan Hospital, New York.

"Tuberculosis Nursing", by Jessie G. Eyre, M.A., S.R.N., B.T.A. (Hons.); Second Edition; 1957. London: H. K. Lewis and Company, Limited. 8¼" × 5¼", pp. 372, with 98 illustrations. Price: 25s.

The first edition was published in 1949. This edition is revised in the light of modern developments in the management of tuberculosis.

"The New Public Health: An Introduction for Midwives, Health Visitors and Social Workers", by Fred Grundy, M.D., M.R.C.P., D.P.H.; Fourth Edition; 1957. London: H. K. Lewis and Company, Limited. 8¼" × 5¼", pp. 216, with 44 illustrations. Price: 18s.

The book relates particularly to the present set-up of medical and social services in England and Wales.

"An Introduction to Psychopathology", by D. Russell Davis; 1957. London, New York, Toronto, Melbourne: Oxford University Press. 8¼" × 5¼", pp. 396. Price: 49s. 9d. (Australian).

The author aims to build a bridge between the psychiatric clinic and the psychological laboratory.

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SATURDAY, NOVEMBER 2, 1957.

THE HANDICAPPED CHILD.

In recent years there has been more interest in the needs of the handicapped; it may be because of Australia's labour needs, but is more likely because of an increased appreciation of the emotional and psychological needs of the individual. Much of the incentive to help the disabled has come from those devoted parents who themselves had been through the mill with a defective child and found how little help was available for them and what agony of mind the parents suffered in their anxiety to give their child the best while feeling ignorant of his real needs. In New South Wales, to quote only one State of the Commonwealth, The Spastic Centre at Mosman, the Far West Children's Health Scheme and the Society for the Care of Crippled Children are but a few examples of the work that private individuals have inspired and carried out. Even so, the position of the handicapped person in the community is not a happy one. Usually he is a pitied dependant with his potentialities unrealized, existing on a pension provided by a society that is only too willing to regard a few paltry pence as substitute for the facilities to develop a normal personality, independence and joy in life.

An inspiring little book by Agatha Bowley,[1] on the young handicapped child, gives a glimpse of what can be done for the blind, the deaf and the spastic if there are facilities available for their training and cooperation between those engaged in their training. It is a book that could be read with advantage by doctor, nurse, teacher, social worker and parent. In fact, a book such as this, written primarily for parents and teachers, if more widely read, could greatly improve the attitude of the general public to handicapped children.

Dr. Bowley is described as an educational psychologist, a term that may discourage some readers, particularly members of the medical profession in Australia; but if we will put aside prejudice, we shall find in the author a woman who has vast experience of young children, normal and handicapped, and who looks at the whole child as a living being, a physical, emotional, social and spiritual being, and what is more, a being with parents. She recognizes that "it is often the parents who have the most difficult task of all", and for that reason she aims to supply factual information about three main types of handicapped children, the blind, the deaf and the spastic. By so doing she hopes to "allay anxiety and build up an informed constructive and intelligent and sympathetic attitude to children who are mentally and physically handicapped".

The child's ability to explore the world and consequently to develop normally is tremendously restricted by the impairment or loss of any of his senses; in fact he will in time and with great help only partially understand the world as we know it. However, he can have another world that we do not know, and Dr. Bowley stresses the importance of Nature's compensations and constantly reiterates the need for the child to acquire independence and accept his disability. Even more important and essential for the mental health of the child is it that the parents should accept the disability and emotionally accept the child; otherwise they cannot help him fully to achieve a satisfying life. Dr. Bowley describes the difficult task of the parents of these children; the two common emotional reactions to a defective child are over-protection—smothering with maternal love that keeps the child a helpless dependant—and rejection, often not open but rather giving the appearance of passionate devotion, but nevertheless with an inability to accept the child with his deformity. For the three main disabilities discussed in this book Dr. Bowley considers that the child should stay with his mother for the first three years if possible, as she alone can supply the love and protection that are essential for normal development in the first three years of life. Unfortunately, few mothers fully appreciate the needs of even the normal child, particularly their first, and Dr. Bowley points out that "the natural ups and downs of family life appear to be magnified by the presence of a cerebral palsied child in the group"; thus "parents need support and expert guidance at each stage of growth".

Doctors will be interested in the facilities available and the optimal ages for helping handicapped children, and they will find themselves better equipped to advise parents if they have a better knowledge of the child's requirements. For instance, early diagnosis and early physiotherapy are extremely important factors in the ultimate prognosis of the spastic child; left to himself, such a child chooses the easiest way and fails to develop muscles that could be used, and so limits his ability to learn about the world. In education of the blind and deaf an intermediate person must interpret the world to the child, and here again modern psychology stresses the role of the parent. No one can substitute for a loving mother in the first three years of life, and this book clearly demonstrates how important it is for the trained therapist to be able to cooperate with parents and work through them in the early years. However, it also states emphatically that special teaching is required for all these children, frequently residential and expensive because of the equipment and the time-consuming nature of the teaching.

Dr. Bowley's book makes it quite clear that only the best can help the disabled. The task demands not only highly skilled people, but people who love children and

[1] "The Young Handicapped Child: Educational Guidance for the Young Blind, Cerebral Palsied and Deaf Child", by Agatha H. Bowley, Ph.D., F.B.Psy.S., with a section on "The Young Deaf Child", by L. Gardner, B.Sc., Dip.Ed., Dip.Psych.; 1957. Edinburgh and London: E. and S. Livingstone, Limited. 7¼" × 4¾", pp. 136, with 36 illustrations. Price: 10s. 6d.

desire to serve humanity. It demands character and knowledge, and Dr. Bowley would go further and say that it needs Christian love. It also needs money. There are many who question the wisdom of spending large sums of money to produce what appear to be minor improvements in disabled children, but one cannot calculate the value of this work in money. As Dr. Bowley writes, "a disability can become a challenge and a test", it can be character-forming, and in the major disabilities the need of the parents is so great that one cannot put a value on peace of mind, comfort and improved family relationships; a minor success for the child may have been a major success for the family. Character building seems to have become a rather old-fashioned idea; so it is encouraging and stimulating to find a psychologist who considers self-discipline, patience and intelligent love as important virtues, who stresses the need to do what one is capable of doing if disuse atrophy is not to set in, and who would quite obviously choose a rehabilitation course rather than cash compensation. Perhaps it would be a good thing if some hard thinking was done in high places. There are shining examples of individual devotion to the blind, the deaf, the spastic, the crippled and the subnormal, but we often see strange official attitudes to the needs of children and parents. No one wants to see government departments take over treatment; but large sums of money are needed to help the handicapped child, and this inevitably means some degree of government control. It would be of great interest to the medical profession to know just what facilities are available for the handicapped at present, who controls them, what percentage of handicapped people become employable, and, above all, whether they are satisfactorily adjusted in our society. Certain it is that much waits to be done.

Current Comment.

PÆDIATRIC EDUCATION.

PÆDIATRICIANS and medical educators will be interested in a recently published report by a World Health Organization study group on pædiatric education.[1]

The objective and role of pædiatrics in medical education are discussed in this report. It is pointed out that sickness and death among infants and children constitute a major public health problem in large areas of the world. Therefore the time assigned to pædiatrics in the medical curriculum must be sufficient to cover the knowledge required to deal with this.

The education of undergraduates is dealt with in all its spheres, including extramural training; it is pointed out that observation and participation in the activities of health and social services in the community can be particularly rewarding when properly prepared and followed up by a critical discussion.

Graduate training for the physician before he enters his practice and training for the clinical pædiatrician are discussed. The group considers that all pædiatricians should eventually become leaders in communal health work, fostering research work and assessing and improving conditions in the community. The role of international agencies in the advancement of pædiatric education is also considered. The booklet provides a stimulating and informative survey of this most vital field of medical education.

"CHILDHOOD'S GREATEST THREAT."

THE words quoted above appeared in the title of an article by Harry F. Dietrich[1] published in 1950. In full this title read: "Accidents, Childhood's Greatest Physical Threat, Are Preventable"; and increasingly, albeit too slowly, the importance of accident prevention in children is being realized both by the medical profession and by the community at large.

The compelling importance of this subject finds further recent expression in a Technical Report from the World Health Organization.[2] The members of the Advisory Group who prepared this report were drawn from several European countries and from England. One consultant was from the United States. The Report confirms the high place accidental trauma takes among the causes of childhood mortality and morbidity, emphasizing that in some countries it has become in fact the chief cause. More than that, in countries such as the United States and Canada "accidents kill more than twice as many preschool children as measles, scarlet fever, whooping cough, diphtheria, dysentery, tuberculosis and poliomyelitis *combined*" (the italics are ours).

The Report emphasizes the value of the epidemiological approach, particularly in regard to morbidity as contrasted with mortality. Fact-finding should include such matters as the events preceding the accident, social circumstances, special risks to which certain communities might be exposed, and the physical and emotional state of those involved in the accident. It is recommended that greater thoroughness be employed in the recording of such details surrounding an accident situation, and it is hoped that by the collection and correlation of such records a definitive approach may be made to the problem of accident prevention in any area. The value of such methods has, indeed, already been shown. For example, in Norway, where the problem of children being drowned in wells presented a special problem, an epidemiological attack resulted in a marked reduction in the number of children drowned in this way. Similar methods of investigation have been applied to a study of traffic accidents by the New York State Department of Health.

Although such programmes will be of necessity costly, the economic burden to the community—quite apart from the obvious humanitarian aspects—must be by no means negligible when one considers the many relatively minor occurrences, such as fractures, burns and non-fatal poisonings. Moreover, the true size of the morbidity aspect of the accident problem in most communities at present is merely a matter of guesswork, and it will remain so without adequate studies based on the techniques of epidemiology.

In the presentation of this particular Report, the members of the Advisory Group were not primarily involved in formulating proposals for educative or legislative measures; although obviously such considerations are intimately concerned with any comprehensive plan for the prevention of accidents. However, they have indicated certain principles of particular or general application. Outstanding is the great importance of self-education of the toddler, so that by experience he may learn to live safely in the midst of danger. This principle has been well emphasized in the writings of Dietrich (to whom reference was made at the beginning of this comment), who shows how the policy of complete protection of the infant should gradually give way to one of education as the child becomes capable of getting into trouble by his own unaided efforts. Instruction in such principles should

[1] "Study Group on Pædiatric Education: Report", World Health Organization Technical Report Series No. 119; 1957. Geneva: World Health Organization. 9½" x 6¼", pp. 20. Price: 1s. 9d.

[1] *J.A.M.A.*, 1950, 144: 1175.

[2] "Accidents in Childhood: Facts as a Basis for Prevention": Report of an Advisory Group; World Health Organization Technical Report Series No. 118; 1957. Geneva: World Health Organization. 9½" x 7", pp. 40. Price: 1s. 9d.

be a foremost obligation of all who have the care of children—and of parents—whether family doctor, pædiatrician or public health nurse.

Engineering measures have an important role also. This might mean, for example, the safe design of nursery furniture; but on the wider scale, the town planner and architect should consider the question of accident prevention in evolving their plans. In the United Kingdom, the number of burning accidents from open fires has been greatly reduced by the provision of fire-guards of improved design.

Legislation is the third leg which provides stable equilibrium for a policy of accident prevention. This may range from a matter of road safety to control of the sale of poisons. Such measures, of course, often enough are of benefit not only to children, but to the whole population.

No country can be proud of the health record of its citizens which does not devote a great measure of thought, energy—and money—to the problem of accidental death and injury. This Report from the World Health Organization should act as a stimulus to all who have the welfare of children at heart.

SYSTEMIC ARTERIAL EMBOLISM.

SYSTEMIC ARTERIAL EMBOLISM is a common complication of chronic rheumatic heart disease, and a less common event from clots in the left ventricle of arteriosclerotic origin. The two together account for over 90% of cases. J. M. Askey[1] has carefully explored an available literature of 281 references and produced a pleasantly reading monograph. This covers little new ground, but is up to date.

Probably 25% to 30% of deaths and an inestimable amount of disability in rheumatic heart disease result from the formation and ejection of left auricular thrombi as systemic arterial emboli. About one in six subjects dies from the first embolic episode, and about half the survivors are dead within three years, nearly half from recurrent embolism. The great danger is recurrent embolism, and it should be remembered that the number of emboli identified in life is small compared with the multiple disseminated lesions found at necropsy. About one in ten deaths in acute myocardial infarction may be due to systemic arterial embolism. In healed infarction and in arteriosclerotic heart disease with hypertension the death rate is less. About one in four subjects dies in the first attack. Recurrent embolism in arteriosclerotic heart disease occurs, but is poorly documented. The commonest site by far is the cerebral circulation; the coronary circulation is rarely affected. With regard to clinical correlations in prediction, auricular fibrillation in rheumatic heart disease identifies 80% of the patients who will have systemic arterial emboli. The causal left auricular thrombus is unrelated in these cases to congestive cardiac failure. The chance of having left auricular thrombus rises with an increasing degree of mitral stenosis.

Despite the fact that embolism is such a danger in mitral stenosis with auricular fibrillation, it is not easy to understand why thrombosis should occur in this site as frequently as it does by single reference to the factors of blood stasis, hypercoagulability or endothelial damage. Clots may lie free in the non-contracting auricular appendage, although there is an apparently intact endothelium and no detectable increase in hypercoagulability. The incidence of thrombosis in other conditions associated with auricular fibrillation is very much lower. The left ventricular mural thrombus occurring in other than rheumatic heart disease is easier to understand, as endothelial damage is always apparent and may follow myocardial infarct or congestive cardiac failure from hypertensive or arteriosclerotic heart disease. The mobilization of left auricular thrombi also is not easily explained. The only occasional correlation is a change in ventricular rhythm from a regular to irregular or vice versa. An increase in ventricular rate alone, if regular, does not increase the incidence of embolism. There is no evidence that exercise tends to increase mobilization of left auricular thrombi, nor does clinical embolism correlate with regular tachycardia, apart from sinus tachycardia such as atrial flutter or paroxysmal supraventricular tachycardia. Embolism therefore is mainly fortuitous in rheumatic heart disease.

Treatment available to reduce the recurrence of left auricular thrombosis in rheumatic heart disease consists of anticoagulant drug therapy to lower the coagulability of the blood as far as is safely possible, restoration of normal rhythm from auricular fibrillation to diminish stasis, and combined mitral valvotomy and left auricular appendectomy to correct the mechanical cause of stasis and to remove an important potential site of thrombosis. Fears that operations undertaken after systemic embolism would predispose the patient to further embolism have not been justified in the event, and the occurrence of systemic embolism is an indication for operation. Continuous anticoagulant therapy is indicated for patients with mitral stenosis and systemic arterial embolism who are ineligible for valvotomy and eligible for the drugs. The therapy is safe if the physician is competent; the patient carefully selected and the necessary laboratory control reliable.

[1] "Systemic Arterial Embolism: Pathogenesis and Prophylaxis", by John Martin Askey, M.D.; 1957. New York and London: Grune and Stratton. 8½" x 5½", pp. 168, with 22 illustrations. Price: $5.75.

CLINICAL EVALUATION OF ANTIHYPERTENSIVE DRUGS.

TEN years ago there was practically no treatment for hypertension. Now the clinician has available a bewildering array of drugs purporting to lower high blood pressure with relief to the patient. I. H. Page[1] considers that it is time to take stock of what has been accomplished and of what needs doing. He sets out the goals of antihypertensive therapy as follows: (i) to reduce arterial pressure to as near normal levels as possible except in advanced arteriosclerotic hypertension; (ii) to induce few side effects; (iii) to prevent the cardio-vascular disease which usually accompanies hypertension; (iv) to prolong life and make it more comfortable; (v) to keep expenses reasonable.

Can arterial pressure be reduced satisfactorily by the drugs now available? Page considers that this is possible with about half the patients. All the drugs now available can and frequently do produce side effects, some uncomfortable, some dangerous. While many patients have been made more comfortable, some have been made miserable. On balance probably the net effect has been for the better. The large number of different drugs available makes selection very difficult, and one must consider the fact that we are in the highly experimental stage with all drugs. The great variability in the reports from different observers is often puzzling. For example, one group of workers states of reserpine that "the drug has no significant effect on pulse or blood pressure". Another group writes in the same journal and at nearly the same time: "Sixty three percent of the patients had become normotensive by the conclusion of the study." Similar differences of opinion are seen with other drugs, and there are great differences of opinion about their toxicity. Often a statement is made that such-and-such a drug lowers blood pressure "significantly", but no definition is given of "significantly". Intensive reassurance of patients can produce results considerably better than some so-called "significant" falls.

One point commonly missed is that hypertension is not a unitary disease. Page considers that the best approach to the patient is an educational one, the giving intensively of common-sense advice to lead him away from fear. After this come the drugs.

The first group of drugs to be considered is the group of the ganglion-blocking agents. These act by competing for

[1] *Bull. New York Acad. Med.*, 1957, 33: 4 (April).

acetylcholine, which is the transmitter of nerve impulses passing through autonomic ganglia. All but one of these, mecamylamine, are quaternary ammonium derivatives similar in structure to acetylcholine. Just what are the physiological mechanisms involved in lowering the blood pressure is still not known, so treatment is empirical. New drugs in this group appear at frequent intervals, and those previously available are largely forgotten. It is hard to see what major improvements have been made in the newer drugs. They are more readily absorbable, and a lesser bulk is needed; but otherwise there does not seem to be much change in refractoriness or side effects. They have become more expensive. Page, from an extensive experience with mecamylamine and chlorisondamine ("Ecolid"), gives his opinion as to their value in treatment. He states that mecamylamine was found effective in half of the hypertensives given an average dose of 25 milligrammes. It is more effective than other ganglion-blocking agents, but the needed dose from day to day is variable. Side effects such as constipation, dryness of the mouth and jerky, choreiform movements of the arms are seen not infrequently; these can be serious and constitute a handicap in use of the drug. Chlorisondamine is a good blocking agent with regular absorption. No complications as the result of its use have yet been seen, and patients are relatively easy to manage. Ganglion-blocking reagents are then useful, but fail in many cases. Their side effects are disturbing.

Reserpine has been much used, but there are great differences of opinion as to its value in reducing high blood pressure. Page has found that reserpine exhibits the same variability of effects as all other known antihypertensive drugs, and selection of patients and dosage is purely a matter of trial and error. Used with some of the ganglion-blocking drugs, reserpine sometimes gives good results. The toxic side effects of reserpine are well known. Hydralazine ("Apresoline") has been in use for about six years, but there is still much disagreement about its value. Many able clinicians find it of little value. In about one-quarter of the patients treated with it by Page the pressure fell to normal.

Whichever of the available drugs is used in treatment there are many failures, and there will be failures until we know a lot more about renal, cardiogenic, endocrinogenic and possibly other types of hypertension. An interesting development from the treatment of patients for long periods with antihypertensive drugs is the appearance of more and more vascular disorders. A number of patients develop advanced arteriosclerosis. The cause of this is not clear; but it may be that the patients live longer, and the treatment given has had no effect on their vascular disease, which has steadily progressed.

PREVENTION OF RHEUMATIC FEVER.

RHEUMATIC FEVER and its prophylaxis have recently received considerable attention throughout the world. Current reviews on the subject are summarized in a useful, brief Technical Report by the Expert Committee on Rheumatic Diseases of the World Health Organization.[1] Despite increase in mortality statistics in many countries, the importance of the problem of rheumatic heart disease is still great, even though exact knowledge of its prevalance is difficult to obtain. Surveys of school children and other well persons, together with data based on hospital admissions in places as diverse as the United States of America, Italy, the Netherlands West Indies, India and Australia, suggest that, in general, as many as 1% to 2% of children in schools may have heart lesions indicating a previous rheumatic attack. Long-continued disability and the risk of recurrence of severe illness are the principal hazards which the patient faces on recovery from an initial attack of the disease.

Infection with hæmolytic streptococci, Group A, is now recognized as the only established inciting factor in the pathogenesis of rheumatic fever. Other agents involved may be environmental conditions, heredity and nutrition, but much further work is necessary before their true significance can be assessed. The prevention of rheumatic fever has been accomplished by control of streptococcal infection wherever it may occur—for example, (*a*) by adequate treatment of streptococcal infections with penicillin in all individuals, (*b*) through the prevention of recurrent attacks in rheumatic patients by continuous prophylaxis, and (*c*) by adequate treatment with penicillin of superimposed streptococcal infection occurring in rheumatic patients.

The Report discusses the place of sulphonamides and penicillin, the latter given orally or parenterally, in the prevention of recurrent attacks in known rheumatic patients, and it is concluded that penicillin has proved somewhat more effective than the sulphonamides as a prophylactic agent. Oral penicillin therapy has the advantage of ease of administration, but requires careful supervision to assure continuity of protection. Intramuscular benzathine penicillin therapy assures continuous protection, but requires repeated painful injections. As yet no strain of beta-hæmolytic streptococci resistant to penicillin has been reported. Side effects have been of little importance in children. The broad-spectrum antibiotics seem to be less effective in prophylaxis.

For the treatment of streptococcal infections, whether in the rheumatic or in the non-rheumatic subject, penicillin is the drug of choice. It is emphasized in the Report that sulphonamides, even though they may suppress the symptoms of pharyngitis, have been quite ineffective in the prevention of rheumatic fever, presumably because they are unable to eradicate the organism from the respiratory tract—this, despite the fact that they have been found effective in the prevention of such infections. Penicillin administered orally for at least ten days, or a single intramuscular injection of benzathine penicillin, is usually effective as therapy. The ability of the tetracyclines to eradicate the organism is much lower.

The Report also emphasizes the instruction in their particular responsibilities of nurses, social workers and other personnel in hospitals and institutions. In its final pages it deals with the practical application of available knowledge in the prevention of rheumatic fever, and it contains a useful appendix on the modified Jones criteria for guidance in diagnosis together with suggested dosage schedules.

This brief monograph merits the careful consideration of those whose medical practice involves the problems of recognition and treatment of streptococcal infection with particular reference to the rheumatic subject, especially the rheumatic child. Everything possible should be done to protect these patients as soon as their state is recognized.

THE EFFECTS OF RADIATION.

Two important publications dealing with the effects of radiation have been issued recently to the World Health Organization. The original publications are not yet available, but in view of their topical importance it is as well to draw attention to information and comments on them made available by the World Health Organization.

The first of the publications is the authoritative report of a Study Group on the Effect of Radiation on Human Heredity. This document brings up-to-date information on the subject and suggests lines for future research to increase knowledge of the genetic effects of ionizing radiations on man and his descendants. It states that all man-made radiation must be regarded as harmful to man from the genetic point of view, and asserts that there are strong grounds for believing that most genetic effects are very closely additive, so that a small amount of radiation

[1] "Prevention of Rheumatic Fever: Second Report of the Expert Committee on Rheumatic Diseases"; World Health Organization Technical Report Series No. 126; 1957. Geneva: World Health Organization. 9½" × 7½", pp. 28. Price: 1s. 9d.

received by a large group of individuals can do an appreciable amount of damage to the population as a whole. The sources of man-made radiation are principally (i) X-ray tubes and nuclear reactors, and (ii) artificial radioactive elements distributed by man in nature. The Study Group was particularly concerned about the genetic hazards of radiation from sources used in medicine, industry, commerce and experimental science. As the report puts it: "Both as an approach to control and as providing basic background information for relating quantitatively radiation exposure and effects on man, it is essential that methods be found of recording exposures to individuals and populations, however difficult this may prove. There is reason to believe that radiation exposure can be much reduced; therefore, those in charge of sources of ionizing radiations should always ensure that there is adequate justification for exposing individuals to doses, however small. The experts add that on account of the long-term danger to populations resulting from irradiation of the gonads by X rays, consideration should be given to determining what efficient means of shielding the gonads could be devised and brought into general use. In addition, they state, in every exposure the X-ray beam ought as far as practicable to be directed so that a minimum of radiation reaches the gonads. The precautions which will have to be taken if nuclear energy is to be safely exploited are manifold, and only the future can show how far the human race can live up to its responsibilities in this respect. Just as important, however, as the Study Group stressed, is the intelligent diagnostic and therapeutic use of X rays or radioisotopes, so that their benefits may be at a maximum, and any possible long-term genetic hazard reduced to a minimum.

The complementary publication is entitled "Challenge of Atomic Energy". It is a special issue of the World Health Organization *Chronicle* and contains a summary of the report and working papers of the Study Group on the Effect of Radiation on Human Heredity, as well as documents on radioisotopes and insect biology, radiation and health, disposal of radioactive waste *etc.* In an introduction to this publication, Pierre Dorolle, Deputy Director-General of the World Health Organization, stresses the danger of excessive exposure to X rays and states that the question of the hazards involved in the indiscriminate use of X rays for diagnostic purposes is of immediate and urgent concern. He recalls that this matter has been taken up by the United Nations Scientific Committee on the Effects of Atomic Radiation, which was set up by the General Assembly of the United Nations in 1955. He goes on to comment that the radiologist and the general practitioner alike will not fail to appreciate the serious implications of the recent warning of the United Nations Committee, but it is to be hoped that they will be equally alive to other dangers, of which the scope and potentialities have not as yet been adequately assessed. Among such dangers is the hazard of exposing early human embryos to X radiation, a risk that was pointed out by Russell and Russell at the First International Conference on the Peaceful Uses of Atomic Energy, convened by the United Nations in 1955, and that was mentioned during the discussions at the Tenth World Health Assembly. "If occupational irradiation does not exceed the accepted permissible weekly dose, there is very little reason to consider it a direct potential hazard to the embryo. The situation is different, however, for some types of medical application of X rays." Dorolle points out, in this respect, that treatment procedures using very high doses of X rays in the pelvic region would certainly involve considerable risk to an embryo in the direct beam. Also, however, certain diagnostic procedures involving unusually high dosage, particularly those using fluoroscopy, might fall into the dose range that experiments on mice have shown will, at least occasionally, produce deformities. And there is no reasonable guarantee that the human embryo is not exposed to similar dangers. Dorolle's conclusion reminds us that the end of the matter is not yet in sight: "Some of the developments illustrated in this issue of the *Chronicle* mark but the first few steps of a long and difficult journey through an uncharted land. The ultimate answer to the challenge of atomic energy will rest on the present generation's alertness, ingenuity, and determination to face up to its responsibilities."

DEXTRAN AND BLOOD COAGULATION.

THE macrocellular material dextran has now been used in clinical medicine as a plasma volume expander for more than ten years. The results generally have been satisfactory, and the material has proved useful when human blood serum or albumin has not been available. Undesirable effects that have been noted are an increased tendency to rouleaux formation with an increased sedimentation rate of the red cells, and an occasional urticarial or pyrexial reaction. These effects have not been considered important contraindications to the use of dextran.

During the past three years, however, a hæmorrhagic tendency has been observed in a few patients following dextran therapy. Ulf Jacobaeus[1] has undertaken an extensive investigation of the in-vivo and in-vitro effects of dextran at all stages of coagulation and has found that the in-vivo effects are essentially reproducible by the addition of dextran to blood *in vitro*. The most striking findings were a reduction and a delay in the consumption of prothrombin and a decrease in the activity of platelets as measured by the prothrombinase or thromboplastin generation test. Some evidence was obtained that dextran inactivates the platelet factor after its liberation from the platelets. On the other hand, dextran was found to accelerate some of the other phases of the coagulation process and to have a direct fibrinoplastic effect. These latter changes were not able to overcome the inhibiting effect on coagulation. Jacobaeus showed that the greater the molecular weight of the dextran preparation used, the greater the decrease in prothrombin consumption. Further, this decrease was shown to be maximal some hours after the infusion, at which time the smaller molecules had left the circulation.

This finding is of interest in view of the tendency to increase the mean molecular weight of dextran preparations in recent years. Such preparations remain longer in the blood-stream and therefore have a more prolonged effect on the plasma volume, but recent reports suggest that in addition to the hæmorrhagic tendency the other undesirable effects already mentioned are more common following the use of large molecule dextrans. Jacobaeus has recommended, therefore, that dextrans with a narrower range of molecular size be prepared. He suggests a range of 60,000 to 80,000. Such molecules would combine a good plasma osmotic effect with a low incidence of the undesirable complications.

It must be emphasized that a bleeding tendency following dextran therapy is a very uncommon occurrence, and that the material should not be withheld because of the coagulation effect when a more suitable resuscitation fluid is not available.

NEW BUILDING IN CANBERRA FOR MEDICAL BENEFITS FUND OF AUSTRALIA.

THE transfer to Canberra of the remaining Commonwealth Government Department from Melbourne and progress in the Snowy Mountains scheme are expected to give impetus to the population expansion of Canberra. This, in turn, has given an added stimulus to the building programme, both private and public, in the capital city. Of interest to the medical profession in this regard is the fact that the Medical Benefits Fund of Australia has commenced the erection of a modern, well-equipped building in Canberra City, and it expects to occupy the building in March, 1958. Four professional suites suitable for doctors' surgeries will be made available on the first floor; but probably the most attractive feature of this development to the general public will be the fact that it will make possible the payment of claims in cash over the counter.

[1] *Acta med. scandinav.*, Supp. 322 (1597).

Abstracts from Medical Literature.

PÆDIATRICS.

Perforation of the Rectum.

R. H. SEGNITZ (*Am. J. Dis. Child.*, March, 1957) describes three cases in which peritonitis resulted from perforation of the rectum. In one of these there was a clear history of trauma through the anus. In the other two there was no such clear history, but it was presumed that this was the likely cause. In one, that of an infant, the author suggests that a thermometer may have been the cause. In the other it is suggested that a fall on to a toy may have been the cause. Peritonitis resulted, and in the first two cases in which there was no history of trauma, the perforation low down on the anterior wall of the rectum was not found at operation. The author suggests that when a surgeon is faced with foul-smelling peritonitis that seems to be due to leakage from the bowel, and when he cannot readily locate the site of the leak, a rectal perforation may be demonstrated by palpation in the cul-de-sac if it is large, or by inflating the rectum with air after the pelvis has been submerged in saline. He reports that he has recently had the opportunity of using this technique in the investigation of a patient who had multiple perforations after being hit in the buttock and perineum by a close-up blast of a 12-gauge shotgun. A number of perforations had been found and closed, but the bubbles of gas escaping from the inflated rectum revealed a tiny perforation in the recto-sigmoid that had been missed in the previous examination.

Juvenile Cirrhosis.

B. A. RUGGIERI *et alii* (*Am. J. Dis. Child.*, July, 1957) report a clinical and pathological study of 27 cases of juvenile cirrhosis. In 15 of these the history was compatible with preceding hepatitis. The gross appearance of 15 of the 16 livers of which adequate specimens or adequate photographs were available for study was consistent with the diagnosis of post-necrotic or post-hepatitic cirrhosis. The gross appearance in one case was consistent with the diagnosis of Laennec's cirrhosis. Sections for histological study were available in all cases, and in all except one the characteristics were in general agreement with the features of post-hepatitic cirrhosis. There is suggestive evidence on clinical grounds in 15 of these cases, and pathological evidence in 26 of the 27, that a preceding hepatitis was the initiating event in the causation of the cirrhosis. The average age at which the initial episode of hepatitis began was 5·8 years. In some of these cases this was a clear-cut episode from which apparent recovery took place, and the average duration of the illness was 2·8 months. In the other group there was continuing evidence of disease until signs of cirrhosis appeared. When the two groups were taken together, the average length of time between onset of illness and signs of cirrhosis was 3·1 years, but the range was wide, extending from three months to 12 years. Prominent symptoms were a tendency to bleeding, often from the nose, abdominal enlargement, jaundice, fever, weakness, loose, frequent stools, abdominal pain, pale stools, anorexia, weight changes, anæmia, œdema and vomiting. Liver failure was the commonest cause of death, but gastro-intestinal hæmorrhage and intercurrent infection were also prominent.

Phenylalanine-Restricted Diet in Phenylketonuria.

F. A. HORNER *et alii* (*Am. J. Dis. Child.*, June, 1957) report the results of treatment of six patients with phenylketonuria by means of phenylalanine-restricted diets for periods varying from eight to 22 months. Two children who were not treated until the fifth year of life are showing sustained improvement in their intellectual functioning. Of two children treated in the third year of life, one is much better and the other has not improved. Two newborn infants treated since the appearance of phenylketonuria are following a normal developmental pattern after 21 and seven months of treatment respectively. It seems apparent that the treatment of older phenylketonurics is sometimes of value, and that treatment of newborn phenylketonurics may prevent the characteristic and profound mental changes often associated with this abnormality. These newborn infants were siblings of other patients in the series. It was interesting that in one of them, phenylketonuria did not appear until the age of six weeks, although it was known that the serum phenylalanine level had been high for a considerable time before the urinary changes appeared. The authors point out that they have recently had the opportunity to follow six other ketonurics who are not having a controlled diet. From them it is obvious that the mental retardation in this disease is not always so severe as was initially thought. In assessing results of treatment, therefore, one should be careful to assess mental improvement accurately, and to be sure that other factors in the child's management other than diet are not affecting this change.

Phenylketonuria with Borderline Intelligence.

D. Y-Y HSIA, W. E. KNOX AND R. S. PAINE (*Am. J. Dis. Child.*, July, 1957) report the clinical story and the detailed psychological and chemical investigation of a girl with phenylketonuria, but with borderline to dull normal intelligence. She was discovered because her sister, aged 18 years, is severely retarded with phenylketonuria and in an institution. The present patient was discovered in the course of a survey for heterozygotes in relatives of known phenylketonurics. She is in the sixth grade of school and scored an I.Q. of 78 by the Wechsler method and 69 by the Stanford-Binet test. Her plasma phenylalanine levels and her urinary excretion of phenylpyruvic, phenyllactic, *o*-hydroxyphenylacetic, indolelactic and indoleacetic acids and of phenylacetylglutamine were all in the range usually observed in patients with phenylketonuria. This case lends support to the existence of phenylketonurics with near-normal intelligence, of whom at least three have already been reported in the literature, but less completely chemically and psychologically documented. The existence of cases of this intelligence range suggests the need for great caution in evaluating the effects of diets low in phenylalanine content or other experimental treatment of the disease.

ORTHOPÆDIC SURGERY.

Treatment of Osteochondritis Dissecans.

I. S. SMILLIE (*J. Bone & Joint Surg.*, May, 1957) draws attention to the knowledge that *osteochondritis dissecans* of the knee joint in children will heal spontaneously. His experiences confirm this, but he is interested to obtain criteria to decide when healing will not occur. He considers that capacity for healing is lost with maturity and may not extend beyond adolescence, and attempts to find a better treatment for these later stages of the condition. He points out that the pathology is mirrored by the X-ray changes, in that there is a horizontal cleavage of the superficial layer of the underlying bone whether the cartilage is intact or broken. This represents a fracture which readily goes on to established non-union. At operation this established non-union is not fibrous, but is free. This accounts for the tendency to separation. When this stage is reached in the adolescent or the adult, the changes are beyond the point of no return and spontaneous healing cannot occur. He attempts to reverse this change by the usual methods of management of non-union—namely, drilling and internal fixation. He describes internal fixation with a screw, and then a later development of technique using stainless steel pins, which are introduced by a special introducer. This equipment is illustrated.

Preparation of the Amputee and Stump Fitting.

R. D. LANGDALE-KELHAM *et alii* (*J. Bone & Joint Surg.*, May, 1957) report their experiences in the Ministry of Health and Limb Appliance Services, Roehampton, and at the King's College Hospital, London. They emphasize the need for early mental and physical preparation. If possible it should begin in the pre-operative stage, particularly in old patients with circulatory disturbances. Usually this is not possible, and general measures are begun as soon as the patient is at all active. Breathing exercises and crutch exercises for the arm and for the good limb are necessary for all lower-limb amputees. Such preparation can be begun before the wound heals. In above-knee amputations the stump is kept extended, not flexed on a pillow. Compression bandaging is used to control terminal œdema. This bandaging is stopped when the œdema disappears. Exercises are begun early, to develop the muscles which are now acting on the stump, particularly hip abductors and hip extensors. In the below-knee amputation, flexion deformity is watched for. The same preparation

applies in the management of the stump in the upper extremity. More emphasis is placed on the mobilization of the remaining joints. Everything is aimed at impressing on the patient the fact that the upper limb prosthesis is not just a "sleeve filler". As early as possible the patient is encouraged to use simple utensils by bandaging them to the stump. The period before the limb is fitted is shorter than usually realized. In above-knee amputations, terminal œdema is usually relieved within six weeks and the limb fitted in two months. In below-knee amputations, the limb is fitted at one month. In amputations of the upper extremities, fitting is carried out earlier still. The authors give a detailed description of the programme of training used to teach the amputee to walk, beginning with balance, the teaching of power of control, carefully graduated weight-bearing, and the use of walking rails to begin with, followed by progress to the open room. Adjustments to the socket in above-knee amputations usually become necessary when the muscles acting on the stump develop. If this is not watched for, excessive piston action may cause trouble.

Amputation Stumps.

H. E. HARDING *et alii* (*J. Bone & Joint Surg.*, May, 1957) analyse many thousands of cases of amputation performed at Roehampton after the first World War, during the second World War and since then in civil life. They state that the conventionally accepted opinion in the choosing of an amputation site, until recently, has been that there is an ideal site in both upper and lower limb amputations. These ideal sites were decided on because the stumps did not break down and surgical reconstruction was rare. Since their investigation, the authors believe that ideal sites are still best when shaft amputations are necessary, but that a satisfactory fitting is possible now with unconventional lengths. In above-knee amputations with a 10 to 12 inch stump, in children and in adolescents the bone should be divided as low as possible. The authors do not recommend that the amputation should be through the broad part of the condyles. There should be a long anterior flap. Muscles should be cut at or below the level of bone. Skin and deep fascia should be sutured separately. Good function is possible with seven-inch stumps. Function is reasonably good with a five-inch stump if it is not bulky. If it is shorter and requires a tilting table socket, then it is better if the head and neck and trochanter are kept. If disarticulation is necessary, a posterior flap is best. Disarticulation of the knee is useful in old age and for children. For below-knee amputations, a five-inch stump should be left; if it is longer, it tends to break down. This may be avoided if ischial bearing is used. The flaps should be equal. The distal end of the tibia should be bevelled, and the fibula should be cut one inch shorter. A one-and-a-half-inch stump can be used to work a below-knee prosthesis. The Syme amputation is now considered useful, as there are better limbs available; it is still considered ugly in women. In the upper limb there should be one inch of humerus below the anterior axillary fold. An automatic elbow mechanism cannot be fitted if there is a disarticulation through the elbow, so an eight-inch humeral stump is best. In below-elbow amputations, some elbow joint is always of value. A seven-inch stump is ideal. A long stump is liable to circulatory troubles. Disarticulation through the wrist is useful with modern prostheses.

SURGERY.

Results of Repair of Large Ventral Hernias with Tantalum Mesh.

W. REMINE AND R. WHITE (*Am. J. Surg.*, June, 1957), writing from the Mayo Clinic, state that tantalum gauze offers a satisfactory method of repairing large ventral defects. It causes no discomfort to the patient that may be considered due to a foreign substance. At the Mayo Clinic 2000 ventral hernias were repaired between 1945 and 1953, tantalum mesh being used in 31 cases. Follow-up information was obtained in 27 cases. The authors consider that the fact that 74% of the group of 27 patients had no recurrence of their hernias was gratifying, especially since these results were obtained in a group of patients whose defects were the worst possible, being so severe that no other type of repair seemed feasible.

Arteriography in Atherosclerosis and Atherosclerotic Aneurysms.

B. EISEMAN AND H. WAGGENER (*Arch. Surg.*, June, 1957) discuss the interpretation of arteriograms in atherosclerotic obliterative and aneurysmal disease on the basis of studies in 134 cases. They consider that the diagnosis of atherosclerotic aneurysm normally can be made without angiographic visualization, and employ such studies only when the indications for operation are in doubt, or because of other complicating factors. Comparison of the angiographic profile of arterial aneurysms and their operative appearance emphasizes the limitations of the method in predicting the size of the aneurysm, the thickness of the thrombotic "pell" and the consistency of the contained thrombus. They now use angiography in obliterative arterial disease only when direct arterial surgery is contemplated. They point out that there is considerable discrepancy between angiographic findings and the operative appearance of an atherosclerotic lesion. This shows that marked pathological changes occur prior to their angiographic appearance, and that both the length of the obliterative lesion and the degree of luminal involvement characteristically are under-estimated by such studies. They observed that angiographic and operative changes similar to those found in atherosclerosis were also found in the major vessels of the lower extremities in four of eight patients with proven Buerger's disease.

Gastro-Jejuno-Colic and Gastro-Colic Fistulæ.

S. MARSHALL AND J. KNUD-HANSEN (*Ann. Surg.*, May, 1957) discuss 49 cases of gastro-jejuno-colic fistula following operation for peptic ulcer and 11 cases of gastro-colic fistula occurring with cancer of the colon or stomach. They state that the diagnosis is readily established in most cases by barium enema X-ray examination. They consider that early surgical treatment is an absolute necessity to prevent severe malnutrition and emaciation. Careful pre-operative preparation is necessary before any type of surgical procedure can be carried out. Surgical treatment of gastro-jejuno-colic fistula following operation for ulcer must be directed at correcting the ulcer diathesis as well as excising the fistula. Thus partial gastrectomy is needed in order to prevent recurrent ulcer or even recurrent gastro-jejuno-colic fistula. Reporting from the Lahey Clinic, they state that the operative mortality in fistula following operation for peptic ulcer has been steadily reduced over a period of 29 years, so that in the last 18 cases, in which a one-stage procedure was used, there were no deaths. They point out that the one-stage operation for gastro-jejuno-colic fistula is not only feasible, but most desirable.

Treatment of Massive Hæmorrhage from Peptic Ulcer.

G. MIXTER, A. IMPARATO AND J. HINTON (*Ann. Surg.*, May, 1957) state that the changing trends of treatment of massive hæmorrhage from peptic ulcer have been towards the increasing employment of early resection following control of hæmorrhage ("elective surgery"). They state that despite more liberal and safer transfusions, there must be continued recognition of the imperative need for operation in these patients in the first 48 hours. They recognize a special group of bleeders, whose disease is not primarily the classical chronic ulcer, but rather what they call a gastro-duodenal diathesis, for which they advocate subdiaphragmatic vagus resection. They have reluctantly come to the opinion that massive upper gastro-intestinal bleeding, at least in indigent and neglected patients, still carries a relatively high mortality, and that this problem calls for vigilance, skill and new thought.

Billroth I Gastric Resection.

G. HORSLEY AND W. BARNES (*Ann. Surg.*, May, 1957) present a detailed description of the technique of the Horsley modification of the original Billroth I operation, and consider that it offers a more physiological approach than other types of partial gastrectomy. They state that when this operation was used in the surgery of gastric or duodenal ulcers, good to excellent results were obtained in 89% and 83% of cases respectively. The patients maintained their weight, and marginal or recurrent ulcers in this series were minimal. As they had followed-up these patients for as long as 27 years, the authors thought that they would not suffer later complications.

Gastro-Intestinal Hæmorrhage of Obscure Origin.

J. KIRTLEY, D. RIDDELL AND E. SMITH (*Ann. Surg.*, May, 1957) conclude, as the result of the treatment of a group of 26 patients with obscure upper gastro-intestinal bleeding in which 21 "empiric" gastric resections were performed, that the results in these cases substantiate the validity of subtotal resection of the stomach when no definite cause of bleeding is found at the time of operation.

Brush Up Your Medicine.

JAUNDICE IN THE NEWBORN.

THE appearance of jaundice in the neonatal period is a most important sign, and its misinterpretation, with failure to apply the appropriate treatment, may lead to early death or to life-long disability.

The importance of early jaundice is that it may be due to hæmolytic disease of the newborn when there is blood-group incompatibility between mother and fœtus. When jaundice appears in the first 24 hours of life, the infant should be regarded as suffering from hæmolytic disease of the newborn and immediate steps in diagnosis should be taken. If a degree of jaundice dangerous to the central nervous system is to be avoided in these cases, replacement transfusion should be carried out within 24 hours of birth at the latest.

The commonest and most serious type of blood-group incompatibility occurs when the mother is rhesus-negative and the fœtus rhesus-positive. For this reason it is essential that the rhesus group of all women in their second or subsequent pregnancy should be known. This should be also known in women having their first pregnancy who have previously received a blood transfusion or an injection of whole blood. Should such a woman be found to be rhesus-negative, the rhesus blood group of the husband should be determined. If he is rhesus-positive, there is at least a 50% possibility that the fœtus will be of the same group and therefore incompatible with the mother, and so may be affected at birth with hæmolytic disease of the newborn.

It is unfortunately impossible to be certain whether a fœtus will be born affected or not prior to its delivery. Estimation of the titre of rhesus antibodies in the mother's blood should be obtained at the sixteenth and thirty-second weeks of pregnancy; but a failure of the titre to rise, or even a fall in titre, does not necessarily mean that the fœtus is not affected. For this reason the cautious obstetrician should regard the second and subsequent pregnancies of rhesus-incompatible parents as capable of resulting in affected infants, and make the necessary plans.

It has been suggested that second and subsequent infants of rhesus-incompatible parents should be delivered in the large obstetric hospitals where replacement transfusion is a routine procedure. This obviously would involve many families in a great deal of hardship, and would in many cases be unnecessary, because a large proportion of infants of such parents need no treatment.

A more practical solution appears to me to be as follows. As soon as the infant of rhesus-incompatible parents is born and before pulsation ceases, the cord is cut. The maternal end of the cord is allowed to bleed into a tube containing a drop of heparin solution and shaken vigorously. A second specimen should be collected into a tube which contains no heparin. A direct Coombs test, rhesus grouping and estimation of the hæmoglobin value can be easily carried out on this blood with the minimum of facilities. If the Coombs test result is positive or if the rhesus grouping gives a positive result and the hæmoglobin value is below 15·5 grammes *per centum*, replacement transfusion is indicated; the infant, accompanied by the specimens of blood, should be sent with all speed to a centre such as a children's hospital or an obstetric hospital for the procedure. Provided that it is carried out within 24 hours, the operation is easy and brain damage prevented. Should the infant have rhesus-negative blood, no further anxiety need be felt. If the cord blood hæmoglobin value is above 15·5 grammes *per centum*, but still below 17·5 grammes *per centum*, there is a possibility that replacement transfusion may be necessary; but the condition will not be acute, and there will be time to send the infant for fuller investigation if jaundice appears. An infant with a cord blood hæmoglobin level above 17·5 grammes *per centum* practically never needs replacement.

If for any reason a mother is delivered whose rhesus group is unknown and the cord blood is not collected, the sign indicating the presence of hæmolytic disease of the newborn is jaundice appearing within 24 hours of birth. If jaundice appears within 12 hours of birth, hæmolytic disease of the newborn is present in a severe form, and replacement transfusion is necessary. Confirmation can be obtained by finding that the mother is rhesus-negative and the infant rhesus-positive, and by a positive response to the Coombs test with the infant's blood. It is important to realize that the severity of the condition cannot be estimated by hæmoglobin estimations on capillary blood. The hæmoglobin value of capillary blood may be over 20 grammes *per centum*, even in a severely affected infant. The early appearance of jaundice and its severity are the important prognostic signs.

Should replacement transfusion be not carried out, about the third or fourth day the dread signs of kernicterus may appear. The earliest is lethargy, which is followed in a few hours by refusal of feeds, head retraction, vomiting and disappearance of the Moro reflex. This picture will be succeeded in many cases by bloody discharge from the nose and mouth, with râles in the lungs and death from pulmonary œdema, or survival after several stormy weeks, but with the life-long disability of athetosis from damage to the *corpus striatum*. There are few conditions in medicine in which with early diagnosis and treatment a normal individual results, but without this early diagnosis and treatment death or life-long disability ensues; hæmolytic disease of the newborn is one of these.

The physician must be on his guard for the early appearance of jaundice in the infant of a rhesus-positive mother. This is due to sensitization of the mother against one of the rarer antigens such as c or E, or to A B O incompatibility. In the former the result of the Coombs test is positive, but not in the latter. In any event it is the degree of jaundice reached which is important, and such patients should have an exchange transfusion if the serum bilirubin level rises above 20 milligrammes *per centum* in the first 72 hours of life.

Physiological jaundice is the commonest cause of jaundice in the first week; it is due to an immature liver being unable to excrete bilirubin resulting from breakdown of red cells in the first few days of life. Jaundice does not appear before the second day of life, rarely becomes marked in the full-term infant, and disappears before the fourteenth day. However, the lower the birth weight, the more immature the liver, and in some premature infants bilirubin retention may be severe. This jaundice undoubtedly is more severe when premature infants have been given vitamin *K* in large doses, such as 10 milligrammes. A dose of one milligramme is now considered quite sufficient. A severely jaundiced premature infant may between the fourth and ninth days exhibit the manifestations of kernicterus as described above, with the typical brain changes if death ensues. When jaundice becomes severe in the premature infant, replacement transfusion should be carried out if the serum bilirubin level rises above 18 milligrammes per 100 millilitres.

Septicæmia, usually due to *Bacillus coli* infection, may present as jaundice in the first week. The infant ceases to suck and may vomit, but may be afebrile. Confirmation of such an infection is gained by a blood culture. The organism often appears in the urine, when there will also be large numbers of pus cells. A tense fontanelle, cerebral cry and twitching or a "blank" look in the eye indicate a lumbar puncture, which may reveal meningitis. Pneumonia is a common feature of such septicæmia.

Congenital syphilis is a very rare cause of jaundice in the live newborn infant. An infant so severely affected is usually stillborn. Appropriate serological tests should be performed, but even if the results are positive a careful search should be made for other causes of the jaundice.

Congenital atresia of the bile ducts with total prevention of passage of bile from the liver to the intestine is the usual cause of prolonged, severe, unremitting jaundice in early infancy. Jaundice may appear soon after birth, but is not usually considered abnormal until it fails to disappear like physiological jaundice by the age of two weeks. Jaundice may not be remarked on until the third week, but in this case it will usually have been noticed that the infant has been passing clay-coloured or white stools prior to this. The jaundice slowly increases to a maximum, the serum bilirubin reaching a level of 10 to 15 milligrammes per 100 millilitres, but never reaches the great heights seen in hæmolytic disease of the newborn. All secretions, including tears, saliva and urine, contain bile pigments. The stools are of putty-like consistency and remain clay-coloured or white. Their colour does not vary, except that some yellow colour may appear, owing to secretion by intestinal glands. The liver is palpable, later large, and hard. Portal pressure is increased, with resultant splenomegaly, ascites and prominent veins draining into the umbilicus. Despite the interference with liver function, the nutrition is surprisingly good until the later stages. A tendency to spontaneous hæmorrhage may occur owing to reduction in prothrombin. Useful laboratory findings are the absence of urobilinogen from the urine and the presence of only a minute amount of bilirubin or stercobilin in the stools. Final diagnosis may depend on exploratory operation, when a liver biopsy will reveal biliary cirrhosis. Exploration should be deferred

till the age of two months, because normal nutrition can be maintained for this period, because normal liver function will result from relief of obstruction even in markedly cirrhotic livers, and because prolonged obstructive jaundice in this age group may be due to temporary obstruction. When atresia is found, operative relief is possible in about 20% of cases, but the operative mortality is high.

A condition which can be confused with congenital atresia of the bile ducts is the prolonged jaundice which may follow hæmolytic disease of the newborn which has been untreated or treated with simple transfusions only, or has been severe and treated with a single replacement transfusion. This is called the inspissated bile syndrome, in which excess bilirubin has caused partial obstruction of the bile ducts, with jaundice and an increased serum bilirubin level lasting up to four months. The jaundice is not severe, and characteristically varies in intensity from day to day, as does the pallor of the stools. The liver is enlarged, and there may be hypoprothrombinæmia and a hæmorrhagic tendency. Bile is found in the fæces, and flocculation tests of liver function give normal results. Blood incompatibility of the rhesus or A B O groups is found between mother and infant.

Hepatitis in the newborn is an occasional cause of jaundice which may be prolonged. It is presumably due to a virus, which is not the same as that which causes infectious hepatitis, but which may be that of *herpes simplex*. This condition may be difficult to distinguish from obstruction of the bile ducts, and a positive diagnosis may wait on liver biopsy. The affected infant is more ill than one with biliary obstruction, flocculation test results are usually abnormal, and there is lowering of the serum protein content.

Generalized cytomegalic inclusion body disease of the newborn is probably due to intrauterine infection with a specific but as yet unidentified virus. The infant is usually immature and soon becomes jaundiced. There is usually bleeding into the skin or from the cord or mucous membranes from thrombocytopenia, with resultant anæmia. The liver and spleen are enlarged. Ante-mortem diagnosis is possible only if the cells in a centrifuged specimen of urine show the specific intranuclear inclusions.

Infants suffering from galactosæmia, an inborn error of metabolism, appear normal at birth, but soon refuse food or vomit, fail to thrive and become jaundiced. The liver and spleen become enlarged and wasting is extreme. The urine contains albumin, casts, bile pigments and a reducing substance, which is easily identified as galactose by paper chromatography. In untreated patients cataracts, mental retardation and cirrhosis of the liver are inevitable. Such infants cannot assimilate the lactose of milk, and if they are given a diet free of this sugar, dramatic improvement and normal growth follow.

S. E. J. ROBERTSON.

Sydney.

Medical Societies.

AUSTRALIAN PÆDIATRIC ASSOCIATION.

THE annual meeting of the Australian Pædiatric Association was held at Canberra on March 30 to April 1, 1957, DR. T. Y. NELSON, the President, in the chair. PROFESSOR ASHLEY WEECH, Professor of Pediatrics, University of Cincinnati, Ohio, was present as guest of honour; he addressed the meeting, and presented a film entitled "For the Whole Child".

Election of Office-Bearers.

The following office-bearers were elected for the year 1957-1958:

President: Dr. M. T. Cockburn.

Vice-President: Dr. K. Fraser.

Honorary Secretary: Dr. E. B. Sims.

Honorary Treasurer: Dr. G. C. de Crespigny.

State Representatives: Dr. Kate Campbell (Victoria), Dr. R. H. Crisp (Western Australia), Dr. R. Wall (Tasmania), Dr. T. Y. Nelson, Immediate Past President (New South Wales).

Admissions to Membership.

The following were admitted to membership of the Association: Dr. Mona Blanch, Dr. G. McL. Blaxland, Dr. W. H. Carey, Dr. C. J. Gibson, Dr. D. Kerr Grant, Dr. W. W. Jolly, Dr. T. G. Maddison, Dr. A. W. Venables, Dr. R. H. Vines.

Immunization Against Diphtheria, Pertussis and Tetanus.

It was decided to send a letter to the Public Health Committee of the National Health and Medical Research Council, stating that the Australian Pædiatric Association considered that all infants should be actively immunized against diphtheria, pertussis and tetanus.

Symposium on Hydrocephalus.

R. D. K. REYE (Sydney) read a paper entitled "Some Recent Concepts of the Physiology of the Cerebro-Spinal Fluid" (see page 637).

ALAN WILLIAMS (Melbourne) read a paper entitled "Hydrocephalus in Childhood" (see page 639).

M. SOFER SCHREIBER (Sydney) read a paper entitled "Hydrocephalus in Infancy" (see page 640).

ROBERT GODFREY (Perth) asked Dr. Schreiber whether he could state the incidence of infection in cases in which ventriculo-ureteric anastomosis had been performed.

Dr. Schreiber, in reply, said that ureteric shunts were performed only on patients in whom other shunts had been completely unsuccessful. This was because in these cases undoubtedly both ascending infection and electrolyte imbalance were problems.

FELIX ARDEN (Brisbane) asked whether polythene or rubber tubing was used for shunts.

Dr. Schreiber replied that for upper shunts rubber tubing, which was well tolerated by the brain, was used, but that for lower shunts animal-tested polythene was preferable to rubber tubing, which irritated the *cauda equina*.

STANLEY WILLIAMS (Melbourne) asked what morbidity followed subdural taps and air studies.

Dr. Schreiber replied that there was no morbidity from subdural taps, and no difficulty was encountered with pneumoencephalography if care was taken to exclude cerebral tumour and the rare condition of unilateral hydrocephalus. Cases of meningitis following ventriculography occurred extremely rarely, and in view of the serious nature of the conditions for which such investigations were performed, that problem was unimportant.

S. E. L. STENING (Sydney) asked whether any of the speakers could give their ideas on the management of neonatal hæmorrhage so that arachnoiditis and subsequent hydrocephaly could be prevented.

Dr. Schreiber replied that if the fluid was heavily blood-stained, the excess blood should be removed, preferably by repeated lumbar punctures, in order to keep the foramina open; if lumbar puncture was not successful, ventricular tap should be performed and continued until the cerebrospinal fluid protein level had returned to a reasonably low level.

PROFESSOR ASHLEY WEECH (Cincinnati) described two cases of unilateral hydrocephalus due to abscess and tumour, respectively, of the choroid plexus, in which hydrocephalus of the contralateral ventricle resulted from mechanical effects.

A Goitrogenic Factor in Milk.

F. W. CLEMENTS (Sydney) read a paper entitled "A Goitrogenic Factor in Milk" (see page 645).

R. WALL (Launceston), in opening the discussion, stressed the necessity of further investigation of other sources of goitrogens, in particular other dairy products and the full range of vegetables consumed by dairy animals. He said that it was interesting to note that goitrogens appeared to affect some individuals and not others. Dr. Wall considered that the incidence of cretinism and hypothyroidism in northern Tasmania was very low, despite a high incidence of goitre. He suggested that that might change in the future if goitrogens, rather than iodine deficiency, were the main cause of goitre. Prevention was in the hands of the agriculturalists, but prophylaxis with iodine was most important. However, the administration of thyroid rather than iodine might in future be the treatment of choice for goitre, particularly in adolescents, and most patients responded well.

E. SIMS (Adelaide) asked whether the calves of cows fed on chou-moellier were goitrous.

Dr. Clements replied that the incidence of thyroid hyperplasia in calves killed in Tasmania was ten times that of a group in New South Wales.

J. Colebatch (Melbourne) asked whether there was any clinical or laboratory evidence of a previous hypothyroid state in those goitrous children from iodine-deficient areas whose thyroids were said to decrease in size as a result of the administration of a thyroid substance.

Dr. Clements replied that no laboratory details were available, but there was no clinical evidence of hypothyroidism in any children studied in Tasmania.

Kate Campbell (Melbourne) asked whether hens were known to eat Brassicæ, and, if so, whether the goitrogens were conveyed to eggs.

Dr. Clements said that he did not know whether hens ate Brassicæ.

Professor Ashley Weech said that a number of therapeutic agents used for the treatment of anæmia in children in the United States contained cobalt, which was said to be a goitrogenic substance. Some cases of goitre had occurred in children so treated.

Dr. Clements said that investigation of the milk samples from cows fed on chou-moellier had revealed no cobalt content.

Artificial Respiration.

J. A. Forbes (Melbourne) read a paper entitled "Artificial Respiration". He said there was still some controversy regarding the method of election for providing prolonged artificial respiration; the recent European school advocated intratracheal positive pressure methods, whereas the older American school derived from the work of Drinker and Wilson in 1929 and 1931, which continued to improve the tank respirator. During the epidemic of poliomyelitis in Denmark in 1952, the number of patients requiring artificial respiration far exceeded the available facilities. That emergency was met by using the anæsthetic method of intratracheal positive pressure to provide artificial respiration. Following Professor Lassen's report of that epidemic, papers in British and European journals had advocated intratracheal positive pressure respiration as the method of choice, at the same time reporting results which were not uniformly encouraging. At that time, the desirability of changing from tank respirators to intratracheal positive-pressure respirators was examined at Fairfield Hospital, where the respirator centre was equipped with the Drinker-type apparatus.

Discussing the advantages of tank respiration, Dr. Forbes said that comparison of the mortality rates amongst patients with pharyngeal and respiratory paralysis admitted to Fairfield Hospital in 1937 and in 1953-1954 with those in Copenhagen in 1952 and also those of United States medical centres, favoured retention of tank artificial respiration as the basic method (Table I). Apart from that prime consideration, even before recent improvements had been made, the tank respirator appeared to offer further advantages which might explain the lower mortality. Tracheotomy with the inevitable tracheo-bronchitis was necessary only in selected cases, and the risks of tracheal damage by a cuffed tube were avoided. The danger of circulatory changes as a result of unopposed intratracheal positive pressure did not arise. The relative ease of management, the rapidity with which patients adapted themselves, the ease of management of a tracheotomy opening when it was present, and the economy of staff, particularly medical staff, were additional advantages. With recent improvements it was now possible to simulate coughing by means of a tank respirator. Dr. Forbes said that all those present were familiar with the basic principles of a tank respirator, in which a patient was sealed so that an intermittent reduction in pressure produced thoracic excursion similar to that of normal breathing.

Turning to recent improvements in equipment and technique, Dr. Forbes said that pulmonary disease had been the major contributing factor to deaths amongst patients undergoing prolonged artificial respiration, and consideration of pulmonary factors had led to three main improvements in tank respirator design and technique in recent years. The introduction of larger bellows capable of producing greater pressures provided greater versatility, particularly with regard to the management of adult patients. Those respirators were capable of ventilating a man weighing 20 stone, and produced pressures high enough to stimulate cough. The introduction of an automatically actuated valve designed to open suddenly at the end of inspiration allowed the intra-tank pressure to revert abruptly, so that the patient's expiration was uncontrolled by the bellows, and the air in the lungs was expelled rapidly by the sudden recoil of the chest wall and lungs. The expiratory impulse produced in the bronchi in that way varied with the extent to which the chest was distended by the intra-tank negative pressure. When intra-tank pressures of −25 inches of water were used, the sudden recoil of chest wall and lungs simulated a cough. The third improvement was the use of a higher positive-pressure phase, which was controlled by the exhaust valve of the bellows, so that the patient's chest was compressed on each expiration. That was designed to expel the supplemental air, reduce the residual volume and efficiently evacuate carbon dioxide, but maintained a minimum resting thoracic volume and aided venous return. The cabinets or tanks themselves had also been improved to facilitate nursing and management. In patients with relatively normal lungs, the routine use of higher tank pressures, with a consequent increase in respiratory volumes, had been successful in preventing pulmonary atelectasis by fuller inflation of the lungs, in maintaining collateral ventilation, in retaining chest wall mobility and in producing an expulsive effect by causing a more rapid flow of air in expiration, utilizing the expiratory valve. It had been found that most acutely ill patients required respiratory volumes considerably greater than those indicated by ventilation nomograms. Negative or inspiratory tank pressure ranging from −8 to −15 inches (−25 to −40 centimetres) of water balanced by a positive-pressure phase of +3 to +8 inches (+7 to +15 centimetres) of water, varying with the size, musculature and respiratory requirements of each patient, were employed to produce basic respiratory volumes from about 400 cubic centimetres in children to 1400 cubic centimetres in some male adults. With the use of respiratory volumes of the order described, rates of 14 to 16 per minute in adults and up to 16 or 18 per minute in children had been adequate. The respiratory excursion and rate were determined individually for each patient according to their size, their oxygen requirements, evidence of carbon dioxide retention, and their respiratory volume, which

Table I.

Poliomyelitis, with Pharyngeal and Respiratory Paralysis: Results of Artificial Respiration.

Source.	Age Group.					
	Fifteen Years and Over.			Under Fifteen Years.		
	Total Number of Cases.	Artificial Respiration.	Mortality.	Total Number of Cases.	Artificial Respiration.	Mortality.
Fairfield Hospital, 1937[1]	22	16	13	274	90	60 (21·9%)[2]
Copenhagen, 1952[3]	156	Not given[3]	62 (39·7%)	165	Not given[3]	57 (34·6%)
Fairfield Hospital:						
1953–1954 (12 months)[4]	37	19	8	30	13	3
1954–1956 (30 months)[5]	53	29	8[6]	32	10	1

[1] Tracheotomy not performed.

[2] Only 24 of those who died underwent artificial respiration, the remainder having pharyngeal paralysis (26·7% of patients who underwent artificial respiration).

[3] Tracheotomy performed in 265 cases; manual bag ventilation was used in 232.

[4] Tracheotomy performed in 15 cases.

[5] Tracheotomy performed in 14 cases.

[6] Including one patient with pharyngeal paralysis, who required tracheotomy but not artificial respiration.

in turn depended upon the state of the lungs, the presence of bronchial and tracheal secretions, and in some cases also the subjective requirements of the patient. Since the "cough effect" of the bellows increased with the negative tank pressure, the question of over-ventilation arose; but in the assessment of that problem the patient's need for "coughing" was given precedence. By gradual alteration in the respiratory volume, no difficulty had been experienced as a result of over-ventilation. Recently the rocking bed had been used in conjunction with the tank respirator for selected patients in the acute stage, to extend the zones of fully functioning pulmonary tissue.

With regard to the clinical application, Dr. Forbes said that poliomyelitis, infective polyneuritis and severe tetanus were the diseases which most frequently involved prolonged artificial respiration. At the Fairfield Hospital, amongst eight patients with infective polyneuritis who required prolonged artificial respiration, and in all of whom pharyngeal paralysis was also present, there were two deaths, one of which occurred as a result of pneumonia after about one week, the other after five weeks from unknown causes. As in poliomyelitis, the prognosis was better in children. The management of severe tetanus, in which clonic spasms demanded total relaxation by means of curare, was more complex in the initial stage, when relaxation must be obtained and a tracheotomy performed preparatory to the commencement of artificial respiration. Tank respiration had been found to be efficient in those cases. Although the technical improvements had been of great assistance, success and further improvement in the management of those cases depended to a large extent on their centralization, so that a full-time staff was able to acquire specialized experience and maintain that experience by constantly managing new cases.

S. E. J. ROBERTSON (Sydney) said that his experience with positive-pressure respiration was limited, but he did not agree that nursing was easier in the tank type of respirator. Dr. Robertson suggested that negative-pressure respiration was most important for the transport of patients with poliomyelitis, tetanus, head injuries or barbiturate poisoning from the country districts to a respiratory centre. He asked whether Dr. Forbes's conclusion that negative pressure was superior had followed experience of both methods, or whether his conclusion was based on a comparison of his results from negative pressure with the results of other centres using positive pressure.

Dr. Forbes replied that it was easy to nurse a patient in the current type of tank respirator, and that intratracheal positive pressure respiration was used to maintain patients when they were removed from the tank for toilet and physiotherapy. He agreed that intratracheal positive pressure respiration was suitable for emergency transport of the patient when indicated, but that the discussion was related to the method of election in a specialized unit. Tank respiration had been successfully used for the transport of patients in a vehicle equipped for the purpose.

Allergic Purpura.

JOHN COLEBATCH (Melbourne) presented a paper on allergic purpura, based on a study of 46 cases which had occurred since 1951. He gave an outline of the supposed ætiology, indicating some of the difficulties that existed in correlating the various hypotheses with the clinical and laboratory findings. Data were presented which suggested a possible relationship of fatigue and nervous factors to the development of allergic purpura. The incidence of renal complications in the 46 cases studied was very much lower than had been reported to be the case in Britain.

This paper will be submitted for publication in full at a later date.

D. G. HAMILTON (Sydney) asked whether Dr. Colebatch considered that chronic renal damage was the greatest long-term hazard of allergic purpura, and quoted the series of Derham and Rogerson, in which a relatively high proportion of cases progressed to chronic nephritis.

Dr. Colebatch replied that many overseas reports included only cases with visceral lesions, and that renal damage was less common in cases without visceral lesions. Experience in Victoria certainly indicated a lower incidence of chronic renal damage, even in the presence of visceral lesions, than had been reported overseas.

PROFESSOR ASHLEY WEECH (Cincinnati) said that there was no evidence of allergy in most cases of allergic purpura which he had seen in Cincinnati, and suggested that the disease should be called by the title non-thrombocytopenic purpura. Professor Weech considered that the fact that the disease usually did not recur, and that there was no definite evidence of a high incidence of C-reactive protein or of raised anti-streptolysin titre, indicated that the disease was not allergic in origin.

Sodium and Chloride Levels in the Sweat of Patients with Fibrocystic Disease of the Pancreas.

CHARLOTTE ANDERSON (Melbourne) described a method which she had found simple and satisfactory for the collection of sweat, and for the determination of sodium and chloride in the sweat.[1] The method was applied to the study of the sweat electrolytes in a series of patients with fibrocystic disease of the pancreas, and to the parents and siblings of these patients. Sweat was collected from the ventral surface of the forearm, after the intradermal injection of two milligrammes of "Mecholyl". A weighed gauze pad was applied to the area, covered with a piece of plastic, and taped to the skin with adhesive plaster for one hour. The gauze pad was weighed again and then extracted with distilled water. Sodium was estimated by the use of an E.E.L. flame photometer. Chloride was estimated by the method of Schales and Schales, using titration with standard mercuric nitrate.

Discussing the results, Dr. Anderson said that in a series of 21 children who were convalescent from a variety of conditions, chest disease and gastro-intestinal disease excluded, the average value for sodium was 26 milliequivalents per litre, with a range of 15 to 39, and for chloride 40 milliequivalents per litre, with a range of 12 to 66. In a group of 21 siblings of children with proven fibrocystic disease, from 22 families, the average value for sodium was 34 milliequivalents per litre, with a range of 15 to 68, and for chloride 40 milliequivalents per litre, with a range of 16 to 64. In a control group of 20 "normal" young and middle-aged adults, 10 male and 10 female, the average value for sodium was 56 milliequivalents per litre, with a range of 27 to 87, and for chloride 52 milliequivalents per litre, with a range of 19 to 82.

In a group of 42 parents of children with fibrocystic disease, including 20 fathers and 22 mothers from 22 families, the average value for sodium was 58 milliequivalents per litre, with a range of 11 to 98, and for chloride 54 milliequivalents per litre, with a range of 10 to 84. The average figures for the adult series were noted to be higher than the levels for the children, and some values were greater than 70 milliequivalents per litre. In a group of 37 cases of proven fibrocystic disease of the pancreas, the average value for sodium was 102 milliequivalents per litre, with a range of 27 to 176, and for chloride 133 milliequivalents per litre, with a range of 27 to 186. In that series, five patients had sodium values below 70 milliequivalents per litre, but two of them had high chloride levels. Three children had levels of chloride in the normal range. All three had pancreatic achylia, but two had no classical chronic chest disease. One had *diabetes mellitus* as well. A group of children with cœliac disease and a group with chronic chest disease were found to have normal levels of sodium and chloride in sweat. The results obtained by the use of "Mecholyl" were a little higher, both with normal and with fibrocystic children, than those obtained after a heat stimulus, but there was the same three to four times elevation in the fibrocystic group. In a composite group of 72 children without fibrocystic disease of the pancreas, all values for sodium and chloride were below 70 milliequivalents per litre. Values above that figure for either sodium or chloride were therefore considered to be abnormal in children. Both normal adults and parents of fibrocystic children were sometimes found to have values higher than 70 milliequivalents per litre, and therefore care had to be taken in interpreting abnormal levels, in adults.

In conclusion, Dr. Anderson said that the method of sweat collection following intradermal injection of "Mecholyl" could be used with out-patients. It semed simple, and no side effects from the use of "Mecholyl" had been noted. However, meticulous care was necessary in the application of the pads, as small amounts of sweat were collected. An adequately equipped biochemical laboratory was essential. The abnormally high values for sodium and chloride in the sweat of patients with fibrocystic disease of the pancreas, first observed by Darling *et alii*, had been confirmed in 34 of 37 cases. However, in a group of 22 families, no abnormalities in the sweat, sodium and chloride content of parents and siblings of patients with fibrocystic disease of the pancreas had been observed, contrary to the findings of di Sant'Agnese *et alii*.

[1] This paper is being published in full elsewhere.

PROFESSOR ASHLEY WEECH (Cincinnati) considered that Dr. Anderson's paper covered the Cincinnati work very well. It illustrated the complex functions of so simple an anatomical structure as a sweat gland, with its property of retaining electrolytes in physiological conditions of health, and wasting them when affected by such a disease as cystic fibrosis of the pancreas.

Problems of Children in a Long-Stay Hospital.

D. GALBRAITH (Melbourne) read a paper entitled "Problems of Children in a Long-Stay Hospital" (see page 646).

M. SOFER SCHREIBER (Sydney) asked whether television had been found of any value at Frankston.

Dr. Galbraith replied that television had not as yet been installed, but that he considered it was inevitable.

The Changing Face of Osteomyelitis in Children.

D. L. DEY (Sydney) read a paper entitled "The Changing Face of Osteomyelitis in Children" (see page 648).

K. FRASER (Brisbane), in opening the discussion, said that the number of cases in which blood culture produced positive results was further proof that osteomyelitis was a pathological elaboration of what had previously been clinically symptomless septicæmia. Pendulum swings with regard to osteomyelitis had been noted, particularly with the introduction of penicillin. A gradual increase in a resistant state to that drug was obvious, and it was now necessary to rely on broad-spectrum antibiotics. Dr. Fraser did not know whether chloramphenicol should be used with other drugs; there was need for clinical research into that question. He considered that surgical intervention was necessary in a case of osteomyelitis diagnosed in the first two days of illness, (i) if at the end of twenty-four hours' treatment the patient was worse, or (ii) if after forty-eight to seventy-two hours he was not improving, or (iii) if fluctuation was present. Sequestrum formation was a definite indication for surgery. Dr. Fraser disagreed with Dr. Dey on the question of bone-drilling, a procedure which he carried out in all cases in which operation was performed, and from which he had seen no harmful effects.

STANLEY WILLIAMS (Melbourne) said that the suggestion that erythromycin should be used at the inception of the disease was to be encouraged. He considered that chloramphenicol, although a dangerous drug, should be used simultaneously with erythromycin, the preparation for intramuscular administration being a useful form of the drug. Dr. Williams stressed the importance of teamwork between physician, surgeon and bacteriologist.

R. SOUTHBY (Melbourne) agreed that erythromycin was most likely to be effective. He was apprehensive about the widespread use of chloramphenicol, as there had been some tragedies, and some children were hypersensitive to that drug.

E. STUCKEY (Sydney) said that the penicillin era had shown that osteomyelitis, if diagnosed early and treated by an antibiotic, could be cured without major surgery. The general practitioner had been taught that the disease could be cured with penicillin; but the disease was now occurring in a florid form unaffected by penicillin. Therefore, the early use of broad-spectrum antibiotics should be taught, as the whole course of the disease was laid down in the first forty-eight hours.

R. GODFREY (Perth) said that in Perth, even two years previously, in 90% of cases osteomyelitis was penicillin-resistant. Erythromycin had been used, and now a number of strains were insensitive to erythromycin. The best results at present were obtained with the tetracyclines.

J. PERRY (Melbourne) said that the number of severe staphylococcal illnesses was now greater than previously, and more systems were involved. More attention should be paid to the prevention of infection because of the prevalence of insensitive strains. His findings concerning erythromycin were similar to those of Dr. Godfrey.

The Pathology of Brain Damage in Febrile Convulsions.

M. FOWLER (Adelaide) read a paper entitled "The Pathology of Brain Damage in Febrile Convulsions".

He discussed a series of five children, aged up to two years, and previously normal except that one had had scurvy, who suffered from prolonged convulsions at the beginning of febrile illnesses—gastro-enteritis (two cases), measles bronchopneumonia (one case), upper respiratory tract infection (one case), and an unidentified illness (one case). The patients remained unconscious after the convulsions, which lasted for one to six hours, but developed various types of spastic paralysis. The cerebro-spinal fluid was normal, except in one case in which a transient rise in pressure occurred, and the white blood cell count was above 20,000 cells per cubic millimetre. In four cases death occurred four days, twelve days, four weeks and eighteen weeks, respectively, from the onset of the convulsions. Post-mortem examination revealed neuronal necrosis of variable distribution and severity in the cerebral cortex, basal ganglia and cerebellum, with no evidence of direct action of microorganisms. The degeneration was most severe in the frontal and temporal lobes. The fifth patient, nine months after the attack, was still comatose, and had spastic hemiplegia, with dilatation of the lateral ventricles and a subnormal cranial circumference.

Dr. Fowler said he considered that the children had suffered from anoxia during the convulsions, with secondary brain damage. Unless the condition was kept in mind, it was likely that such convulsions might be mistaken for the symptoms of a primarily cerebral disease, such as encephalitis. Those responsible for the treatment of sick children should be aware of the potentially lethal nature of febrile convulsions. The brain changes might be of ætiological significance in relation to some cases of infantile spastic conditions, temporal lobe epilepsy and behaviour disorders.

T. Y. NELSON (Sydney) asked how Dr. Fowler distinguished his cases from cases of anoxic conditions following birth trauma.

Dr. Fowler replied that the history was helpful, but the two conditions could not be distinguished on histological grounds alone. However, in his cases the history indicated that the children had been normal until the onset of convulsions.

D. G. HAMILTON (Sydney) agreed that febrile convulsions should be regarded seriously. The occurrence of a single severe convulsion, more than one convulsion, evidence of brain damage, or a family history of convulsions, was an indication for adequate treatment with "Mysoline" or "Dilantin" for a period of at least two years. Dr. Hamilton stressed the possibility that mild and transient brain damage might follow convulsions, and that *status epilepticus* might give rise to grossly abnormal electroencephalographic patterns, persisting for variable periods, but reverting to the preexisting rhythm after days or weeks.

Hyponatræmia and Central Nervous System Disease.

D. B. CHEEK (Melbourne) read a paper entitled "Hyponatræmia and Central Nervous System Disease" (see page 649).

J. PERRY (Melbourne) emphasized the paradoxical situation described by Dr. Cheek, in which the serum sodium concentration was low, yet body sodium depletion was not present. The transfer of water to the extracellular space gave rise to dilution of the extracellular electrolytes. Thus Dr. Cheek had demonstrated the importance of understanding volume. Dr. Perry was interested to learn that low chloride levels in the cerebro-spinal fluid were an indication of a breakdown of the blood-brain barrier and not due to body chloride loss. It had been taught for years that a low cerebro-spinal fluid chloride level was due to chloride loss.

PROFESSOR LORIMER DODS (Sydney) asked Dr. Cheek whether he would discuss the ætiology of hypernatræmia.

Dr. Cheek replied that hypernatræmia could occur in association with several disturbances of the central nervous system. There were four main groups. First, the unconscious patient had no thirst mechanism, so that a low fluid intake often occurred which led to hypertonic dehydration. Secondly, the high solute load from a high protein content in concentrated feeds given by the parenteral route required a large amount of water for its urinary excretion. That caused hypertonic dehydration. The protein concentration in solutions employed for tube feeding should not be greater than 30 grammes per litre. Thirdly, a tumour or other lesion destroying the posterior lobe of the pituitary gland could give rise to *diabetes insipidus* with hypernatræmia. Finally, a cerebral lesion on the under-surface of the frontal lobe had been noted in association with hypernatræmia. That pattern had been seen in elderly people after cerebral trauma. There was no apparent loss in extracellular volume in those patients, and the urinary excretion of salt was minimal.

R. SOUTHBY (Melbourne) asked Dr. Cheek whether he considered that the convulsions and the confused mental state in patients with tuberculous meningitis were due to electrolyte disturbance.

Dr. Cheek replied that a few patients with tuberculous meningitis might develop water intoxication, which was often difficult to distinguish from an uncomplicated hypotonic expansion of the extracellular space. He suggested that, if the serum sodium level was very low, a calculated amount of hypertonic saline should be administered to see whether one could raise the sodium concentration to 120 milliequivalents per litre. Any attempt to raise the level to normal was futile, and furthermore, sodium loading in patients deficient in potassium (as in tuberculous meningitis) was a deleterious procedure and increased cerebral irritability. Clearly inflammation of the central nervous system was important with respect to convulsions and confusion, but electrolyte disturbance was also of consequence.

The Absorption of Orally Administered Penicillin V.

A. D. MATHEWS (Melbourne) read a paper entitled "The Absorption of Orally Administered Penicillin V". He said that "Penicillin-V" (phenoxymethylpenicillin) had been given orally to a series of children and adults in one of three separate forms—potassium salt, calcium salt or free acid. The resultant blood concentration and urinary excretion levels were of the same order with each type when the penicillin was taken after meals. However, when it was given before or with meals, the potassium salt achieved a higher peak concentration in the blood than the other two, but urinary excretion of penicillin was unchanged. Nevertheless, all forms achieved an adequate therapeutic level irrespective of the time of administration. An oral dose of 200,000 units of any of the three types of "Penicillin-V" maintained a therapeutic concentration in the blood for at least four hours in 96 out of 105 tests made on adults and in tests made on children.

This paper will be published in full later.

STANLEY WILLIAMS (Melbourne) said that crystalline penicillin G given by mouth was adequate for the practical treatment of many infections, and Dr. Mathews agreed with that view. It was apparent that the various penicillin V preparations were superior. Because the absorption after oral administration of either form of penicillin by sick children was not fully known, it was recommended that in all serious infections requiring penicillin, initial treatment should be by injection.

D. GALBRAITH (Melbourne) asked Dr. Mathews how ill the children in his series were, and whether Dr. Mathews considered the absorption would vary when the drug was used for very sick children.

Dr. Mathews replied that they were cooperative children who were not ill; there might be different effects with very sick children. The only toxic effects noted after the oral administration of penicillin V were a very occasional mild rash and mild diarrhœa.

FELIX ARDEN (Brisbane) said that the real significance of Dr. Mathews's paper was that, except in rare instances, the giving of penicillin by injection was now out of date. Far too many children were still receiving penicillin "needles", and the emotional trauma so caused was insufficiently considered.

PROFESSOR LORIMER DODS (Sydney) agreed with Dr. Arden about the probable value of penicillin V as a means of avoiding injections, but emphasized the fact that the parenteral administration of penicillin would still be necessary for certain significant infections. He thought that the oral administration of penicillin V would be a satisfactory form of treatment for a rheumatic child suffering from a real or supposed streptococcal infection, but stressed the fact that that statement was based on the assumption that the mother would continue to give that preparation by mouth over a period of ten days; if there was any doubt about the mother's cooperation, it would be preferable to give one intramuscular injection of a preparation such as "Bicillin (All-Purposes)", which would provide an adequate blood level of penicillin for ten days.

Hydrocele Treated by Excision of the Patent Funicular Process.

D. MCKAY (Adelaide) read a paper entitled "Hydrocele in Children Treated by Excision of the Patent Funicular Process". He said that all surgeons were fully aware of the downward projection of the peritoneum, known as the *processus vaginalis*, which preceded the descent of the testis, and of the manner in which the testis invaginated itself into the lower portion of the processus to acquire for itself a *tunica vaginalis*. In the normal course of events the *tunica vaginalis* was the only portion of the *processus vaginalis* which remained; but all agreed that remnants might persist, the most common being the sac which gave rise to an inguinal hernia. Many surgeons, when operating for hydrocele, had noted that frequently a narrow tubular connexion extending from the *tunica vaginalis* to the peritoneal cavity could be demonstrated. It was a miniature hernial sac, or more correctly, a patent funicular process. It had not been generally appreciated that, in those cases at least, the fluid in the *tunica vaginalis* was peritoneal fluid, and for a cure of such hydroceles all that was required was the severance of that connexion with the peritoneal cavity. No attack on the tunica in the way of either excision or evagination was necessary. At times it was extremely difficult at operation to demonstrate a patent funicular process; but he was convinced that such a process did exist in all cases.

Dr. McKay went on to say that, holding the view of the congenital origin of all hydroceles in children, he had, over the last ten years, been resecting the patent funicular process as a routine procedure. A small puncture was made into the *tunica vaginalis* to allow of evacuation of the fluid, but otherwise the tunica was left undisturbed. He had records of over 50 patients so treated, and as yet he had no knowledge of a recurrence. His thesis was that all hydroceles in children, whether of the *tunica vaginalis*, of the spermatic cord or of the canal of Nuck in the female, were congenital, and due to the persistence of a communication with the peritoneal cavity. All fluid in hydroceles was peritoneal fluid.

Recent Advances in Pædiatric Endocrinology.

N. WETTENHALL (Melbourne) read a paper entitled "Recent Advances in Pædiatric Endocrinology", in which he dealt particularly with some diagnostic aids in the recognition of endocrine disorders. He said that it was obvious that an adequate history and full clinical examination were essential; particular attention should be paid to evidence of hormone under-activity or over-activity, such as the presence of secondary sex characters, though in that regard it should be remembered that sensitivity of the target end-organ was also a factor. A knowledge of the range of normal was imperative for a proper appreciation of one's findings, and yet in the pædiatric age group there were still yawning gaps. The distinguishing feature of childhood was growth, and a number of studies had been and were being carried out to determine the rate and normal range of physical development from birth to adult life. Those studies might last up to 20 years. The best example was the work carried out by Stuart in Boston, who had published some excellent growth charts. However, an investigation over that length of time ran into many difficulties, and many people now thought that a shorter-term investigation over approximately three years would give the same results for considerably less expense. A simple cross-sectional investigation overlooked the velocity gradient of growth, which Tanner in London had pointed out was of special importance; but the growth spurt of puberty, at least in England and the United States of America, was now occurring earlier than it did 20 to 30 years previously. That might well be true also in Australia, but the standards of other countries were not necessarily applicable. At the moment a number of countries were cooperating in such growth surveys, and it appeared well worth considering the advantages to Australia of joining in such a project. In the assessment of rate of growth, the main diagnostic tool, other than physical measurement, was X-ray examination of the skeleton, especially to determine the time of appearance of various epiphyses. That was of particular value in cases of dwarfism; *e.g.*, delayed bone age was a *sine qua non* of hypothyroidism. X-ray examination of the wrists alone was not really adequate to decide whether bone age was delayed, and a skeletal survey was preferable, if not ordered indiscriminately. Dr. Wettenhall went on to say that one of the most exciting discoveries in recent years was the finding that the sex of an individual could be determined by the presence of a chromatin granule in the nucleus of body cells of a female, while those granules were absent in males. Such a finding had been known in relation to insects for 20 years or more; but Barr in Canada had first recognized the fact in mammals, including humans, in 1949. His original technique was to examine the cells of a skin biopsy, but more recently it had been usual to examine leucocytes from blood or a scraping from the buccal mucosa. The last-mentioned now appeared the most popular, for it was easy and non-traumatic to take such a smear, the only snag being that the many cocci normally present in the mouth might in unskilled hands be confused with sex chromatin granules. That technique had led to some interesting findings; for example, the majority of patients with Turner's syndrome, though essentially female in appearance,

gave male skin biopsy findings, while the reverse held true in Klinefelter's syndrome, in which many individuals essentially male in appearance gave female skin biopsy findings. So far as he knew, no one had suggested that all patients with Turner's syndrome should now dress and behave as males, nor that patients with Klinefelter's syndrome should dress and behave as females. Yet there was a tendency to regard the skin biopsy as the final determinant of sex in certain other conditions, particularly in babies with ambisexual development. Dr. Wettenhall held that the skin biopsy should be regarded as only one factor in helping to determine the sex of a particular individual.

Dr. Wettenhall went on to say that steroid chemistry had progressed by leaps and bounds in the last two decades and was still making such rapid strides that most clinicians were left out of breath. It was impossible for the ordinary clinician to have the knowledge of an organic chemist; and yet to have any understanding of the value of tests that they ordered from the pathology laboratory (often difficult and costly to perform), an attempt should be made. The basis was, of course, the cyclopentenophenanthrene ring (Figure I). That always looked alarming and put people

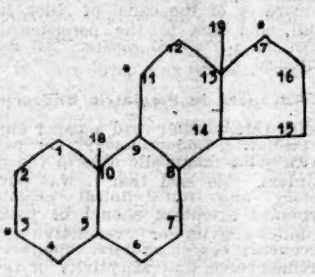

FIGURE I.

off, but there were one or two simple facts worth remembering. Three positions in that ring were of special importance—namely, 3, 11 and 17, for three reasons. (i) All steroids so far found to be active in the human body had an O atom at the C3 position and an unsaturated bond between C4 and C5 (Figure II a). The breakdown products of those steroids were hydroxylated at C3 and lost the unsaturated bond between C4 and C5. (ii) At the C11 position, an O or OH group might be present, or there might be no attached group. That was important from the point of view of the effect of the steroid—*e.g.*, cortisone, hydrocortisone, DOC—but was not specifically tested in the laboratory. (iii) The side chain from the C17 position was the main distinguishing characteristic of the various steroids, the carbon atoms in that chain being numbered 17, 20 and 21 (Figure II b). Probably the best known steroids

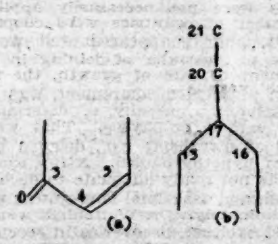

FIGURE II.

to most people were the 17-ketosteroids, in which that side chain had been lost and replaced by an O atom at the C17 position. It was known that 17-ketosteroids were mainly breakdown products of androgens, and their detection in 24 hour specimens of urine was now almost a routine procedure in most teaching hospitals. However, it was obviously desirable to have methods which could measure other steroids as well. Most interest had been shown in the 17-hydroxycorticosteroids, in which four subgroups of the C17, 20, 21 side-chain were known. The best known of them was the 17 OH, 20 keto, 21 OH subgroup, which included cortisone, cortisol and their breakdown products; that was the only group estimated by the Porter Silber technique, which was the method most commonly used in the United States of America. The other subgroups of 17-hydroxycorticosteroids were, of course, important, particularly that including pregnanediol, whose excretion was greatly increased in the adreno-genital syndrome. Methods were being devised for estimating each individual subgroup. A method devised by Norymberski, of Sheffield, estimated all four subgroups of 17-hydroxycorticoids, and had found widespread acceptance in Britain, but appeared to be hardly known elsewhere. Actually Norymberski had devised two techniques. In one, 17-hydroxycorticoids were measured directly. In the other, sodium bismuthate was added to a specimen of urine after 17-ketosteroids had been measured; that converted the 17-hydroxycorticoids present to 17-ketosteroids, and the total could again be measured. The figure thus obtained was known as the amount of 17-ketogenic steroids. In children, in whom the quantities of steroids produced were much less than in adults, the use of that more sensitive method seemed highly desirable.

Dr. Wettenhall then said that the accurate estimation of corticoids in blood remained in its infancy. Nelson and Samuels first described their chromatographic procedure in 1952, and they and other workers had progressed from there; but different laboratories produced very different figures even in normal adults. That investigation must remain for a while mainly a research tool, though a routine procedure using small amounts of blood would be invaluable for endocrine diagnosis in children.

Dr. Wettenhall went on to say that much interesting work was being carried out in thyroid disorders. Radioactive iodine studies had proved very valuable in the investigation of adults and of some children; but in view of the evidence that irradiation of the neck area in infancy had subsequently led to development of carcinoma of the thyroid, most people now thought it unwise to use I^{131} in children. I^{132} with its much shorter half-life might have a place in the future.

Dr. Wettenhall said, in conclusion, that he had made no attempt to cover a large field of endocrinology, but had briefly considered certain points that he thought might be of general interest, and at the same time had a particular importance in pædiatrics. One of the strongest impressions he had gained from his trip abroad was how easy it was for pædiatricians to camp by their billabong and fail to gather in some of the fat jumbucks which were constantly growing up in kindred disciplines of adult medicine and of science. As pædiatricians, they had much to learn from those who studied adult endocrinology; but they were particularly favourably placed to observe the effects of hormones on growth and the onset of puberty, in both of which fields knowledge was still very scanty. The answers would not be easy, but the search was well worth while.

T. Y. NELSON (Sydney) said that he was interested in the idea of growth surveys and wondered whether any were being conducted at present in Australia.

Dr. Wettenhall said that he know that Dr. Roche, of Melbourne, was conducting a survey, and that Professor Lorimer Dods had given some consideration to that question.

F. W. CLEMENTS (Sydney) said that it had been recommended that existing data be used in the compilation of graphs and charts, called "Preferred Growth Rate Charts". Some would be available shortly. The Institute of Child Health had been interested in those studies for some time. However, the interpretation of data presented considerable difficulties. A longitudinal study of a group of children extending over fifteen years or so had considerable disadvantages because of the sociological and other secular changes that occurred. A three to four years' study of overlapping age groups was probably to be preferred.

Staphylococcal Pneumonia.

The Complications of Staphylococcal Pneumonia.

D. G. HAMILTON (Sydney) discussed the complications of staphylococcal pneumonia. He said that the staphylococcus caused suppuration and tissue necrosis, so that in the lung many tiny abscesses formed, and from them there might be a number of developments. (i) By drainage of small abscesses into the bronchi, multiple small air spaces might appear in the lung. (ii) If the opening of any of those into the bronchus acted as a check-valve, distension of the space occurred, with the formation of a large, air-filled, cyst-like space in the lung. (iii) If one of those ruptured into the pleural space, a pneumothorax, sometimes under tension, developed. (iv) Adjacent small abscesses might coalesce to form a large abscess. (v) If an abscess ruptured into the pleural space, empyema resulted. If the abscess connected to a bronchus as well, pyopneumothorax was produced. In

his series of 32 patients, five had multiple small air spaces, four had large cyst-like spaces, 15 had pneumothorax (10 with tension), six had large abscesses and 24 had empyema.

Dr. Hamilton said that cyst-like air spaces had occurred in the lungs of nine patients. In five of them the spaces were small and multiple, but in four they expanded to a considerable size. Those large spaces were uniformly rounded and bounded by a thin clear line that was probably nothing but compressed lung tissue. The distinction from loculated pneumothorax was often plain if lateral and antero-posterior films were studied, but sometimes that distinction was difficult. Because of their clear, thin outline, those spaces had been called egg-shell cysts. They were not really cysts. Perhaps a better name was emphysematous blebs, as long as it was not thought to imply that they resulted simply from alveolar distension and rupture from obstruction of the air passages. He believed that they resulted from distension of small abscess cavities, which, having drained into the bronchus, remained connected to it by a valvular opening. They rarely needed any treatment, and resolved completely and quickly.

Dr. Hamilton then said that spontaneous pneumothorax had occurred in 15 cases; in 10 there was tension, often great enough to cause acute and urgent respiratory distress. The occurrence of tension pneumothorax was perhaps the commonest cause of sudden deterioration in a child with staphylococcal pneumonia. The pneumothorax might be single or loculated by pleural adhesions. If the pneumothorax was small and causing no distress, it could be left alone. But if there was distress from intrapleural tension with collapse of the lung and perhaps with mediastinal shift, treatment by aspiration was essential, and might be urgently required, for the degree of distress might be very great indeed and the child gravely ill. Continuous suction by an intercostal cannula or soft rubber tube inserted through a cannula and connected to a continuous suction apparatus seemed satisfactory. The use of a sharp-pointed needle was probably not wise, for sometimes complete reexpansion of the lung occurred in a few hours, and it was not good to have a lung rubbing continuously against the point of a needle. The aspiration should be maintained for several days to give the broncho-pleural fistula a chance to heal. In one case of the series, bilateral pneumothorax with multiple loculations was the major cause of death. In six others pneumothorax was the major factor in making the patients gravely ill.

Referring to lung abscess, Dr. Hamilton said that it had been diagnosed during life in only two cases. In one, a large abscess was found when the chest was explored because an empyema had failed to heal after thoracotomy. It was cured by lobectomy. The other was found by X-ray examination after an empyema had been drained by repeated needle aspirations. In contrast to the cyst-like air spaces, the shape of its cavity was irregular, its wall thick and shaggy, and the surrounding lung tissue relatively radio-opaque. That abscess resolved spontaneously by draining into the pleural space; but it took months for the area of increased opacity to clear from the lung, in contrast to the rapid clearing of cyst-like air spaces. However, of the eight patients who died, abscesses were found at autopsy in the lungs in four. Dr. Hamilton said that that did not surprise him, for he believed that the formation of abscesses—often minute abscesses—was the fundamental pathological process that underlay the complications of staphylococcal pneumonia.

Dr. Hamilton went on to say that in his series of 32 patients there were 24 examples of empyema. In some instances the pus was small in amount, in some it was very large; in some it was loculated by pleural adhesions, in others it was free in the pleural cavity. In one child there was a large empyema on each side of the chest. Many of those children had other complications as well. It was fair to say that if an infant had severe pneumonia, the causal organism was likely to be a staphylococcus, and if that was so there was a strong probability that empyema would develop. One had therefore to be constantly on the alert for that complication. Its diagnosis was not always easy, particularly in infants, for in them the layer of fluid was often relatively small in amount, and so the changes in physical signs were relatively slight. Those changes were diminution in resonance of percussion note and in intensity of breath sounds and vocal resonance, and fremitus. To detect changes in resonance in a small child, gentle percussion had to be used. Heavy percussion could be kept for the thick chest walls of adults. Breath sounds, even bronchial breath sounds from the not far distant large air tubes, might be quite well conducted through the thin layer of fluid and thin chest wall of the infant, and the examiner had to listen carefully. To detect the valuable changes in vocal resonance one had to depend on the grunts or cries of the infant, for few of them could be persuaded to talk. Thus, examination had to be meticulous; but it had to be gentle, too, for those infants were gravely ill and did not stand well any but the gentlest handling. X-ray examination with a portable machine should be used without hesitation if there occurred any deterioration in the condition of one of those patients which could not be adequately explained by physical examination. The X-ray film might reveal an empyema or pneumothorax that was not obvious on clinical examination. But it was wrong to carry those infants to an X-ray department for frequent examinations, to expose them much or to handle them roughly. Empyema was treated by drainage. Needle aspiration was always the first step. If pus was found, continuous drainage might be instituted at once by means of a thoracotomy, a cannula inserted intercostally or a small tube inserted through a cannula. If the pus was thick and contained fibrinous clots, thoracotomy was necessary. Instead of continuous drainage, daily needle aspiration with or without instillation of antibiotics into the pleural space could be used. That method was chosen only if the pus could be freely and fairly completely withdrawn and if rapid resolution of the empyema was obvious.

Dr. Hamilton said that of his 24 patients, nine had had thoracotomy, four had had continuous cannula aspiration and five had had repeated needle aspirations. All had recovered except one of the thoracotomy group, but the cause of his death was bilateral loculated tension pneumothorax. Six other children with empyema had died. In two cases the diagnosis was made too late, even though the patients had been in hospital for some time. The remaining four were moribund on admission, and died after a single aspiration or before even that could be carried out. Dr. Hamilton said that he believed that in no case did the method of drainage contribute to the fatal outcome. Except for the patient with bilateral loculated pneumothorax, all the deaths occurred in late or overwhelming disease, and there was little opportunity for treatment. They could be attributed to failure in diagnosis rather than to failure in treatment.

Staphylococcal Pneumonia in Infancy and Childhood.

J. D. HARLEY (Sydney) read a paper entitled "Staphylococcal Pneumonia in Infancy and Childhood". This paper will appear in the issue of November 9, 1957, at page 673.

Discussion.

ELIZABETH TURNER (Melbourne), in opening the discussion, said that the conclusions that they had reached in Melbourne with regard to staphylococcal pneumonia were similar to those of Dr. Hamilton and Dr. Harley. Primary staphylococcal pneumonia commonly affected the very young, particularly those recently discharged from midwifery hospitals, and it was seen in two forms—first, the fulminating type, with toxæmia which could cause death in a matter of hours, and secondly, severe pneumonia in which suppurative necrotic pulmonary lesions often developed, some of which might eventually need surgical drainage. Secondary staphylococcal pneumonia tended to occur in patients with other debilitating incurable diseases, such as congenital cardiac disease or mucoviscoidosis, and constituted a constant and increasing risk to children in hospital. The resistance of the organism seemed to vary with the antibiotics in current usage; but at certain periods there did seem to emerge more virulent strains against which most of the antibiotics appeared to be ineffectual.

Dr. Turner said that, in view of the high incidence of primary staphylococcal pneumonia in infants recently discharged from midwifery hospitals, and also in view of the statement made by Capon in 1955 that the incidence of staphylococcal infection in midwifery hospitals had increased in recent years, she had investigated the incidence of such infections in the only two nurseries at the Queen Victoria Memorial Midwifery Hospital in Melbourne—first, in the premature babies' nursery, and secondly, in the observation nursery, where were nursed those infants born as the result of abnormal or difficult deliveries, or suffering from congenital anomalies, or erythroblastosis, or for adoption. All other infants in that hospital were nursed at their mother's bedside. In spite of a high standard of medical and nursing care, premature infants exhibited a high rate of staphylococcal infection. Over a period of six months from January to June, 1956, 192 premature infants had been admitted to the nursery, 45 from other midwifery hospitals. The rate of staphylococcal infections producing symptoms was 33·8%. All the infections were mild (except one), and all were eventually controlled by the appropriate antibiotics. The commonest site of infection was the nose; 36 infants developed "snuffles" due to staphylococci, 22 infants

had "sticky eyes", and 14 infants had mild omphalitis. All the staphylococci tested were sensitive to chloramphenicol, an antibiotic rarely used at that hospital; six only were sensitive to penicillin. One premature infant died as the result of staphylococcal infection. He was suffering from jaundice, and cortisone was given to combat the hyperbilirubinæmia, as it was technically impossible to perform exchange transfusion; he developed a scalp abscess, staphylococcal septicæmia, thyroiditis and lung abscesses, in spite of concurrent antibiotic administration. In the observation nursery, the records of 611 full-term infants were investigated. Thirty-four had been admitted to hospital on the first to the third day of life from other midwifery hospitals. Thirty-eight (6·2%) had contracted mild staphylococcal lesions; none died from them, and again the chief site of infection was the nose, then the eyes and the skin; all again were sensitive to chloramphenicol, and one only was sensitive to penicillin. All infants from both nurseries were apparently free from infection on their discharge from hospital, and were required to attend the out-patient department for a number of months. Dr. Turner said that to her knowledge two infants only showed a recurrence of staphylococcal lesions after leaving the nurseries.

Dr. Turner then referred to a paper by L. I. Taft, published in THE MEDICAL JOURNAL OF AUSTRALIA of December 10, 1955. She said that Dr. Taft had shown that during the year 1953, 41 children had died at the Royal Children's Hospital, Melbourne, from staphylococcal infections; of 39 deaths from pneumonia at the hospital in that year, staphylococcal infection was a significant factor in 37. Twenty patients had been admitted to hospital with primary staphylococcal infections, ten of them directly from maternity units or foundling homes, or within several days of their discharge therefrom. Dr. Taft had stated that "the severest lesions with a tendency to disseminate locally and metastatically occurred in the early months of life". The high incidence of deaths due to pneumonia in Melbourne that year coincided with an increase in the prevalence of influenza in the community, and it seemed probable that the influenza virus might have played a part in a few of those cases. Death from toxæmia and pulmonary damage occurred in many cases before antibiotics could have effect—the so-called fulminant cases. Recently, if a child was admitted to hospital with symptoms suggestive of fulminating staphylococcal pneumonia, erythromycin was given intravenously without delay, and in a few cases staphylococcal antitoxin appeared to have been beneficial.

Dr. Turner went on to say that she had made an examination of the records of 97 infants aged under six months who had been admitted to the Royal Children's Hospital, Melbourne, during the three-month period from September to December, 1954. All those infants either had a staphylococcal infection on their admission, or acquired such an infection in the wards. The most common site of infection was the nose and throat (54 cases), next the skin (18 cases). Nineteen strains were sensitive to penicillin, 41 to chloramphenicol and 73 to erythromycin. There were thirteen deaths in the group. Two were due to staphylococcal pneumonia occurring as a long-standing descending infection in children with mucoviscoidosis. Eleven infants died of terminal staphylococcal pneumonia complicating congenital anomalies, and three died of primary staphylococcal pneumonia. Eighteen infants of the 97 were admitted to hospital with primary staphylococcal pneumonia, and there was a sex incidence of thirteen males to five females; three had died. Seven of the eighteen children had developed empyema as a complication of the pneumonia. One had "bullous" lesions in the lungs, and one had a pneumothorax. Of the staphylococci isolated, fifteen were sensitive to erythromycin, one from an empyema was sensitive to penicillin, and two, from children who eventually recovered, were insensitive to all antibiotics tested. Finally, in recognition of a probably increased incidence and severity of staphylococcal infection in midwifery hospitals, a committee comprising representatives from the Royal Children's Hospital, Melbourne, midwifery hospitals and the Victorian Public Health Department had met in Melbourne, and prepared a booklet outlining the minimum requirements for hospital care of the newborn. That booklet had been published at the same time as the special report on staphylococcal infections in maternity hospitals by the National Health and Medical Research Council. Copies of the booklet were available for any one who was interested.

T. Y. NELSON (Sydney) said that the problem was serious and was being discussed in all cities. He wondered why the children developed such a fulminating illness; whether it was due to general debility, to the severity of the actual infection, agammaglobulinæmia, or to some developmental abnormality of the lungs. Present considerations relating to diagnosis and the early approach to the problem would be valuable.

M. COCKBURN (Adelaide) said that the difficult case was the one in which antibiotic treatment had been given before one saw the child. Complications were more common in such cases. X-ray studies were helpful to decide some forms of treatment. Careful clinical observation and daily X-ray examinations were the routine in Adelaide. Lung punctures were not being performed in Adelaide.

R. GODFREY (Perth) said that experience in Perth had been similar to that in Sydney. The mortality was much greater in children aged less than six months. Therefore, children in that age group should receive intensive treatment. Every attempt should be made in such cases to determine the organism and its sensitivity.

FELIX ARDEN (Brisbane) said that severe staphylococcal pneumonia was one of the instances in which treatment should take precedence over bacteriological diagnosis. He considered that family doctors should be encouraged to administer broad-spectrum antibiotics at once when confronted by a baby with pneumonia aged under six months.

J. FORBES (Melbourne) asked Dr. Harley if there had been any correlation between the organism grown on culture from throat swabbing and that isolated from lung puncture.

Dr. Harley replied that routine throat swabbing had not been performed, but that the results of culture from laryngeal swabs had been compared with the organism obtained from the pleura or lung in sixteen cases. In only seven of them had *Staphylococcus aureus* been obtained from the larynx, and in four the antibiotic sensitivities of the organisms were identical. In the interpretation of those results it was important to remember that an interval of days, during which antibiotics had been given, frequently separated the taking of the laryngeal swab and the aspiration of the chest.

R. SOUTHBY (Melbourne) wondered about the source of those organisms. He asked Dr. Turner if there had been any routine investigation of the infants' mothers, or of members of hospital staff, and if the babies' umbilical cords had received any routine treatment.

Dr. Turner replied that staff members had had throat and nasal swabbings taken; occasional persons with staphylococcal infections had been isolated and treatment with antibiotic ointment, applied to the nose, had been instituted. It was not usual to discover the staphylococcus in the swabs taken from the mothers, and furthermore, those babies were nursed apart from their mothers. The babies' cords were painted with "Monacrin" or iodine solution, and as a result of that, there had been a lowering of cord infection. Nasal and eye infections were far more common.

CLAIR ISBISTER (Sydney) said that she considered that examination of nasal swabs was the best way of isolating the organisms. The organisms were always derived from maternity hospitals, phage type 80 being the predominant one. She disagreed with early X-ray studies, as they were of very little assistance in the first twenty-four hours, during which time the infant might die from toxæmia. Dr. Isbister advocated the avoidance of over-handling of those infants and the use of large doses of broad-spectrum antibiotics. She asked Dr. Harley how many of the organisms in his cases had been phage-typed.

Dr. Harley replied that phage-typing had not been performed on the organisms obtained from cases in the series.

PROFESSOR ASHLEY WEECH (Cincinnati) said that the problem was indeed serious. He suggested that there be studies to show correlation between the results of examination of nasal swabs and material obtained on lung puncture.

H. G. RISCHBIETH (Adelaide) made a plea for a new line of thought on the subject of primary staphylococcal pneumonia and its treatment; at present the fight was being lost in a depressingly high percentage of cases. He said that he was purposely ignoring the subject of terminal or secondary staphylococcal pneumonia, which he regarded as quite a separate entity, both in its clinical manifestations and in its epidemiology, except perhaps in the case of the premature infant. He drew attention to the following facts. (i) Commonly, if not invariably, the introduction of the staphylococcus to the family, although not necessarily to the victim, took place in a maternity hospital in the form of "minor" sepsis of skin, eye or umbilicus in the baby, or of breast abscess or skin infection in the mother, and painstaking history-taking would obtain that history in almost every case. As further presumptive evidence of that, in eight out of nine cases occurring in the age group greater than 18 months, a sibling had been born within the previous

three months. (ii) Once the body defences had been overcome, with increasing drug resistance on the part of the staphylococcus, the arsenal of weapons was fast emptying. (iii) Toxæmia was perhaps the most important cause of death, as had been suggested earlier, and the improvement after the use of staphylococcal antitoxin was often dramatic. Dr. Rischbieth offered for consideration the suggestion of active immunization of mothers during pregnancy in an attempt to improve host resistance. He said that it was known that staphylococcal toxoid would produce a rise in antitoxin titre lasting for three months or more, although one had to agree that its use in the person already infected was usually disappointing. Many antibodies—*e.g.*, whooping-cough, diphtheria, *etc.*—were transmitted via the placenta when the mother was immunized during pregnancy, although one was unable to find good evidence whether that applied to the staphylococcus or not. In conclusion, Dr. Rischbieth said that, although the obvious difficulties were appreciated, immunization of the mother, so that at least her titre, and probably that of the baby, might be raised from the seventh month of pregnancy until one month after delivery, was suggested as a procedure worthy of consideration in the prophylaxis of primary staphylococcal pneumonia.

(To be continued.)

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

EARLY TRAINING OF NURSES IN SYDNEY.

[From the *Australian Medical Gazette*, October, 1887.]

AT a meeting of the Board of Directors of the Sydney Hospital held on October 4 a letter was received from Dr. Muskett, the secretary of the honorary medical staff, stating that the honorary medical staff approved of the proposed regulations with regard to a course of instruction to the nursing staff, and at the same time they were of opinion that before any certificate to a nurse should be granted the recipient should have attended a course of instruction, passed an examination therein, and have remained for a period of not less than two years in the hospital. The regulations suggested by the medical staff were approved of, with the proviso that they should not be retrospective, as it was considered that a hardship might be inflicted on some of the nurses who had been for some time at the hospital if they were compelled to attend the lectures and pass the examinations.

THE B.M.A. IN TASMANIA.

[From the *Australasian Medical Gazette*, August, 1887.]

WE are pleased to know that it is proposed to found a branch of this Society in Tasmania and that a provisional committee consisting of Drs. E. L. Crowther, Perkins, Giblin, Butler, Gray, Payne and Elliott with Dr. Smart as President and Drs. Parkinson and Wolfhagen as Secretaries has been appointed. A medical society was urgently needed in that colony to bring the various members of the profession into friendly contact and to provide a medium for the report and discussion of cases of interest. It will also establish an authority to which matters in dispute between individual members might be submitted to a neutral and kindly authority for decision. It cannot fail to keep up, if it exists, and to bring about, if it is absent, that friendliness amongst its members which is so essential to the well being of a learned profession and which is perhaps of greater value in that of medicine than any other. We wish the new Society every success.

Correspondence.

MALARIA IN ARMY PERSONNEL.

SIR: Shortly the 2nd Battalion of the Royal Australian Regiment and some ancillary units, together with the servicemen's wives and families, will be returning to Australia from service in Malaya.

It may be unnecessary to do so, but I would like to remind medical practitioners that many parts of Malaya are malarious. Therefore, it is suggested that malaria should be borne in mind in any case of fever occurring in a member of the Australian Military Forces, or in one of his family, who have been stationed in Malaya.

Army personnel who are serving in or likely to pass through malarious areas are given "Paludrine" daily as prophylaxis against malaria. Although a causal prophylactic against malignant tertian malaria, "Paludrine" acts only as a suppressive against benign tertian malaria, and this latter form of malaria does occur in Malaya. When the routine taking of "Paludrine" is ceased, attacks of benign tertian malaria may therefore occur.

Because of the high incidence of benign tertian malaria occurring in Australian soldiers after their return to Australia from service in Korea, a routine primaquine course was introduced for all personnel returning from Korea. This markedly reduced the number of cases of benign tertian malaria occurring in those troops after arrival in Australia.

Available information is such that a routine course of primaquine for all personnel returning from Malaya does not appear warranted. However, further information concerning this is highly desirable, and this can only be gained if all attacks of malaria occurring in personnel who have been stationed in Malaya are recorded.

It is realized that malaria is a notifiable disease in most, if not all, States of the Commonwealth, but it would be greatly appreciated if medical practitioners would also inform the Deputy Director of Army Medical Services in their State of any case of malaria under their care occurring in members of the Australian Miliary Forces, or their families, who have served overseas.

The addresses of the various Deputy Directors of Medical Services are as follows:

Deputy Director Medical Services, Headquarters, Northern Command, Victoria Barracks, Brisbane, Queensland.
Deputy Director Medical Services, Eastern Command, Victoria Barracks, Paddington, New South Wales.
Deputy Director Medical Services, Southern Command, Albert Park Barracks, Melbourne, Victoria.
Deputy Director Medical Services, Central Command, Keswick Barracks, Adelaide, South Australia.
Deputy Director Medical Services, Western Command, Swan Barracks, Perth, Western Australia.
Deputy Director Medical Services, Tasmania Command, Anglesea Barracks, Hobart, Tasmania.

For any medical practitioner who may be interested, the current Army routine treatment of the various types of malaria may be obtained from the Deputy Director of Army Medical Services in his State.

Yours, etc.,

W. D. REFSHAUGE,
Major-General, Director-General
Medical Services (Army).

Australian Military Forces,
Military Board,
Headquarters,
Victoria Barracks,
Melbourne, S.C.1.
Victoria.
October 1, 1957.

PRESERVATION OF ANAL SPHINCTERS IN THE TREATMENT OF CARCINOMA OF THE RECTUM.

SIR: Mr. Anthony R. Kelly, in his letter (M. J. AUSTRALIA, September 28, 1957), states that the article by Mr. E. S. R. Hughes (M. J. AUSTRALIA, August 31, 1957) on the "Preservation of Anal Sphincters in the Treatment of Carcinoma of the Rectum" was more suitable for publication in a surgical journal, and most surgeons will agree with that. On the other hand, there will be less agreement with some other remarks in Mr. Kelly's letter, for he seems to be perpetuating the late Ernest Miles's hope that the abdomino-perineal type of procedure will cure most cases of carcinoma of the rectum. Miles based his operation on the pathological findings in advanced cases of carcinoma of the rectum, that is, in cases with widespread metastases, and he believed that an abdomino-perineal procedure could provide a cure in such advanced cases. Unfortunately, this is not so, as any independent review of the results from hospital patients will prove. If the pathological findings in patients who actually do have a prolonged survival after an abdomino-perineal type of excision of a carcinoma of the rectum are examined, it will be found that there is really little basis for such a belief.

To support what may be considered such an heretical statement, I would like to direct attention to an article of mine that was published in *The Australian and New Zealand Journal of Surgery* of January, 1949. From a study at the St. Mark's Hospital, London, of the dissected specimens removed by an abdomino-perineal type of procedure from patients suffering from a carcinoma of the rectum, it was found that out of a consecutive series of 301 patients only 121 survived for five or more years, and that in none of these 121 was the spread of the disease very extensive. Also none of the specimens from these 121 survivors showed any spread below the primary tumour, either directly or by way of the lymphatic system.

In his paper Mr. Hughes reported 302 personal cases of carcinoma of the rectum subjected to operation, but in only 42 (13·9%) of these was a sphincter-preserving operation performed. How each of these 42 cases was selected is not stated; but, in general, I believe that there are three indications for such a choice: first, if the general condition is good and the primary tumour is situated above the level of the pelvic peritoneum; secondly, if the resection can only be palliative and there is no possibility of any increased benefit from a wider resection; and thirdly, if the patient, against all advice, absolutely refuses a colostomy. It would be interesting to know if Mr. Kelly disagrees with any of these indications.

An anterior resection of the rectum with an anastomosis low in the pelvis is a more difficult technical procedure than an abdomino-perineal type of resection, and it is not surprising that, with experience, Mr. Hughes has found it possible to include a higher percentage of sphincter-preserving procedures. One presumes, however, that this increase is mainly in the cases of palliative resections.

Mr. Kelly states that "most surgeons would not accept division of the rectum two centimetres below the growth, if we were patients", but he does not discuss the unnecessary removal of many inches of the bowel below the growth which is so often carried out by certain well-known contemporary surgeons abroad, even when the primary tumour is small and is in the recto-sigmoid region. Many of the same surgeons will even be found to favour, in practice, the abdomino-perineal procedures against the sphincter-preserving procedures as a routine palliative measure. These surgeons may be making life easier for themselves, but they are certainly not doing the best for each of their patients. Their choice of operation can only be explained by a personal bias against any other procedure than the one in which they have been trained. It is often forgotten or overlooked, in these arguments on the extent of the rectum to be removed distal to the primary tumour, that retrograde spread is only found in specimens which also show very extensive spread of the disease in other directions. In other words, retrograde spread only occurs in cases in which there is no chance whatever of the ultimate prognosis being affected by any operation.

Finally, may I repeat that I am of the opinion that the operation employed in any individual case of carcinoma of the rectum should be determined by a consideration of many factors, and should be chosen from a variety of possible procedures; and may I also repeat that I believe more time should be spent studying the pathological findings in the cases of carcinoma of the rectum which have apparently been cured by radical surgery, instead of studying the spread of the disease in cases which could not possibly be cured by any surgical manœuvre. Such an increased study of the pathological findings in cases of carcinoma of other viscera which have been cured is also long overdue.

Yours, etc.,

EDWARD WILSON.

159 Macquarie Street,
Sydney,
October 3, 1957.

THE L.E. PHENOMENON.

SIR: I have recently seen three patients with puzzling multi-system disorders who have been reported on as demonstrating the L.E. phenomenon in their blood. If they are indeed examples of *lupus erythematosus*, it presupposes a new clinical concept of that disease, or perhaps alternatively, by using methods which heighten the sensitivity of the test, it may indicate a disorder of the auto-immune mechanism, wherein auto-antibodies are developed against leucocytes because of a failure of the antibody-producing mechanism to recognize the white cells as self-constituents due to a modification of the "self markers", by disease, injury or chemical agents (Joske and King, 1955).[1]

Freidman *et alii* (1957),[2] using the clot method, examined 91 patients with rheumatoid arthritis for L.E. cells and found 25 positives, 14 strongly positive, eight moderately and three weakly so. In one case in which the L.E. test was markedly positive, post-mortem evidence revealed no *lupus erythematosus*. Histological proof of *lupus erythematosus* was absent in two further cases with positive blood tests, the material being a renal biopsy and an excised spleen respectively.

Because of the serious prognostic implications and the possibility of unnecessary steroid therapy that may ensue from misinterpreting this test, I examined the relevant literature on the subject.

In 1946 Hargreaves discovered the L.E. phenomenon, which, briefly, is seen in hæmatologic smears in two stages: (i) rosettes of leucocytes around nucleoprotein; (ii) the L.E. cell, a leucocyte which has engulfed a round mass of nucleoprotein.

The original technique called for heparinized bone marrow concentrates from the subject under investigation; later work showed that three essentials were required for a positive result: (i) active neutrophiles, either from the patient's marrow, buffy coat of his clotted blood, or from a similar source in a person with a compatible blood group, or from an animal's marrow, *e.g.*, a dog; (ii) nucleoprotein material, probably of lymphocytic origin from a similar source as (i); (iii) the important plasma factor, possibly produced by a disturbance of the desoxyribose nuclease enzyme and anti-enzyme systems. This factor is stable at room temperature if kept sterile, and may be retested up to six months later. Although it is found in the globulin fraction of the blood, it is immunologically distinct from normal gamma globulin.

Both Haserick (1954)[3] and Marmont (1956)[4] regard the techniques of using clotted blood as over-sensitizing the original test, and the former states: "It may be positive when there is very questionable evidence of lupus erythematosus." Haserick prefers heparinized marrow from dogs, and in his hands this method gives quick and not over-sensitive results. Moreover, he stresses the need for controls using normal plasma and known positive plasma in cases where weak positives occur, and recommends in doubtful cases that human marrow be used.

Butterworth (1953)[5] showed that if crystalline bovine DNA-ase was added to blood and the Zimmer-Hargreaves (1952)[6] clot technique used, 15 out of 20 samples revealed L.E. cells, and in the control tubes seven out of twenty also showed typical L.E. cells in small numbers (less than one per 10,000). He concluded that the occurrence of even a few L.E. cells in normals emphasizes the need for quantitative evaluation of the L.E. test.

In view of this, it may be wise to adopt Marmot's cautious approach and always have one test done on defibrinated blood and one by the anticoagulant method, the latter with the patient supplying both the reacting plasma and the marrow cells, or a combination of the patient's plasma and the buffy coat from another compatible individual or from a dog's marrow.

In Haserick's experience, if the heparinized dog's marrow is used, a three to four *plus* positive test, consisting of three or more rosettes per high-power field *plus* L.E. cells, is evidence of *lupus erythematosus*, with no false positives. If the test shows one to two rosettes per high-power field and no L.E. cells, but when repeated on human marrow L.E. cells are seen, it is likely to be L.E., but rare possibly false positives can occur after "Apresoline" administration or with a penicillin reaction.

Using this conservative technique, it is recommended that L.E. cells be looked for in the following conditions: (i) rheumatoid arthritis, (ii) positive serology for syphilis, (iii) epilepsy, (iv) nephritis, (v) persistent leucopenia, (vi) pleural or pericardial effusions, (vii) purpura, (viii) hæmolytic anæmia, (ix) recurrent pneumonitis, (x) photosensitivity.

Yours, etc.,

ZELMAN FREEDMAN.

217 Macquarie Street,
Sydney,
October 5, 1957.

[1] Joske, R. A., and King, W. E. (1955), *Lancet*, 2: 477.
[2] Friedman, I. A., *et alii* (1957), *Ann. Int. Med.*, 46: 1113.
[3] Haserick, J. R. (1954), "Blood Factor in Lupus Erythematosus", in "Modern Trends in Dermatology", Butterworth: 76.
[4] Marmont, A. (1956), *Lancet*, 1: 387.
[5] Butterworth, C. E. (1953), *J. Clin. Investigation*, 32: 558.
[6] Zimmer, F., and Hargreaves, M. (1952), *Proc. Staff Meet. Mayo Clin.*, 27: 424.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Week-End Course in Practical Hæmatology.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a week-end course in practical hæmatology, suitable for clinicians, will be held under the supervision of Dr. R. J. Walsh in the Basement Laboratory in the New Medical School, the University of Sydney. The programme is as follows:

Saturday, November 16: 9.30 a.m., "The Value of the Blood Film in General Practice"—preparation of film, demonstration and exercise, examination of selected films, Dr. Edgar Thomson; "The Control of Anticoagulant Therapy in Practice: Simple Tests of Blood Coagulation", Dr. H. Kronenberg; 2 p.m. to 5 p.m., "The Collection of Blood Samples for Hæmatological Examinations; Hæmoglobinometers and the Measurement of the Hæmoglobin Value", demonstration and exercise, Dr. R. J. Walsh and Dr. G. T. Archer; "The Leucocyte Count in General Practice", demonstration and exercise, Dr. E. Marjory Little.

Sunday, November 17: 10 a.m. to 12.30 p.m., "Blood Grouping, Rh-Typing and Cross Matching", demonstration and exercise, Dr. H. K. Ward.

The fee for attendance at the course is £3 3s. It may be necessary to make a small charge for refreshments. Early written application, enclosing remittance, should be made to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephone: BU 4497-8.

Week-End Course in Psychosomatic Medicine.

The Post-Graduate Committee in Medicine in the University of Sydney announces that a week-end course in psychosomatic medicine for general practitioners, under the supervision of Professor W. H. Trethowan, will be held in Sydney on Saturday and Sunday, November 23 and 24, 1957. The programme is as follows:

Saturday, November 23: Scot Skirving Lecture Theatre, Royal Prince Alfred Hospital. Chairman, Dr. K. S. Harrison. 2.15 p.m., "The Psychosomatic Approach", Professor W. H. Trethowan; 3 p.m., "Asthma", Dr. David Ross; 4.15 p.m., "Migraine", Dr. D. C. Maddison.

Sunday, November 24: Scot Skirving Lecture Theatre, Royal Prince Alfred Hospital. Chairman, Dr. David Ross. 10 a.m., "Peptic Ulcer", Dr. Stanley Goulston; 11 a.m., "Endocrine Aspects of Emotional Disturbance", Dr. Keith Harrison; 11.45 a.m., "Psychosomatic Aspects of Pregnancy and Childbirth", Professor W. H. Trethowan. Broughton Hall Psychiatric Clinic, Wharf Road, Leichhardt. Chairman, Professor W. H. Trethowan. 2.15 p.m., case demonstrations and discussion, Dr. John Ellard; 4.15 p.m., "Uses and Limitations of Psychotherapy in Psychosomatic Medicine", Dr. D. C. Maddison.

The fee for attendance is £3 3s., and early written application, enclosing remittance, should be made to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephone: BU 4497-8.

Visiting Lecturers.

On behalf of the Hallstrom Institute of Cardiology at Royal Prince Alfred Hospital, the Post-Graduate Committee in Medicine in the University of Sydney announces that Dr. Henry Bahnson, Associate Professor of Surgery at the Johns Hopkins Hospital and Chief Assistant to Professor Alfred Blalock, will give the following lectures and demonstrations at the Stawell Hall, 145 Macquarie Street, Sydney, at 8.15 p.m. on the dates shown: Thursday, November 21, "The Heart Pump Oxygenator"; Tuesday, December 3, "Arterial and Aortic Grafting".

Dr. F. Spencer, Assistant Professor of Surgery at the Johns Hopkins Hospital, will lecture on "Hypothermia and Its Clinical Application" at the Stawell Hall, 145 Macquarie Street, Sydney, on Monday, November 25, at 8.15 p.m.

Clinical sessions will be held in the Scot Skirving Lecture Theatre, Royal Prince Alfred Hospital, at 2.30 p.m. on the following days: Tuesday, November 26, "Pulmonary Hypertension in the Management of Left-Right Intracardiac Shunt"; Thursday, November 28, "Cyanotic Congenital Heart Disease"; Tuesday, December 3, "Ischæmic Heart Disease", "Constrictive Pericarditis".

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED OCTOBER 12, 1957.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	3	2(1)	3(2)	..	1	..	..	..	9
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	1(1)	..	..	..	..	..	1
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	1	1	..	..	..	..	..	..	2
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	2(2)	8(7)	..	..	1	9	..	..	20
Diphtheria	..	..	..	..	1(1)	..	..	..	1
Dysentery (Bacillary)	..	1(1)	..	..	3(3)	..	..	..	4
Encephalitis	..	1	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	45(22)	16(14)	2(2)	..	2(2)	1	1	..	67
Lead Poisoning	..	..	1(1)	..	..	..	..	..	1
Leprosy	..	..	..	..	3	..	..	..	3
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	1	..	..	..	1
Meningococcal Infection	4(3)	1	..	..	..	..	..	..	5
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	..	..	..	..	..	..	..	..
Puerperal Fever	..	..	2	..	..	..	..	..	2
Rubella	..	61(50)	15(18)	32(16)	13(12)	..	..	..	121
Salmonella Infection	..	..	..	..	1(1)	..	..	..	1
Scarlet Fever	11(5)	12(10)	4(2)	2(1)	3(2)	1(1)	..	..	33
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	..	..
Trachoma	..	..	..	..	15	..	..	..	15
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	35(17)	12(7)	19(7)	2(1)	8(7)	2	7	3	88
Typhoid Fever	..	..	..	..	2(2)	..	..	..	2
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

The visits of Dr. Henry Bahnson and Dr. F. Spencer have been made possible by generous grants by Sir Edward Hallstrom. The purpose of their visit is to demonstrate and assist in the establishment in Sydney of the total cardiac by-pass technique.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

THE Executive Committee of the Australasian Medical Congress (British Medical Association), Tenth Session, to be held at Hobart from March 1 to 7, 1958, has forwarded the following notes for publication.

To date 400 members have applied for membership of the forthcoming Congress. As the majority of members will be accompanied by their wives, the Accommodation Officer has already booked 600 beds in Hobart. The accommodation is now at the stage where members have the choice of a one-star hotel or private hotel or a guest house, or bed and breakfast in a private home. There is still some better accommodation available in the outlying suburbs, some 10 to 15 miles from Hobart, and those who intend to come and who have a motor-car may wish to state on their application forms that they would prefer this better but more remote accommodation. Also, by courtesy of the Department of Health, we now have the opportunity of using the new Nurses' Home at New Town, Hobart, as a bed and breakfast residential. This building, where we can accommodate 60 people in single rooms, is a new and modern building with all facilities. Bed and breakfast only can be provided, but there are ample facilities in Hobart for dining at the main hotels in the city. Those applying for accommodation will be given more details of this accommodation and asked if they would like to stay there.

Forms for application for membership of Congress are available from the office of the Local State Secretary of Congress in each State.

The inaugural meeting, which is on the night of Monday, March 3, will be held at Wrest Point. Circulars about this will be sent to Congress members at a later date.

The Sir Henry Simpson Newland Oration is to be held in the City Hall on the night of Thursday, March 6, and it is anticipated that the Oration will be delivered by the Right Honourable R. G. Menzies, C.H., Q.C.

On registration, members will be given a folder containing a programme, handbooks, road maps and maps of Hobart and of the University of Tasmania, which will facilitate their orientation in Hobart during Congress week.

Congress is arranging some free excursions for members and their wives and entertainment for the junior members accompanying their parents to Congress. Much private entertainment is also being arranged.

A crèche is being organized for the care of young children during the daytime, but there are no facilities for caring for young children at night. This will have to be a matter of private arrangement by any member who so desires it.

The Executive Committee is finding difficulty in obtaining sufficient sponsors for those who have requested sponsoring, so some compromise may have to be made in the sponsoring arrangements, and members will be informed later of any modifications.

There has been some change in the speakers at the Plenary Sessions, who will now be as follows: "Heart Failure", Dr. J. Halliday, Dr. I. Monk and Dr. B. Sinclair-Smith, with Dr. Austin Doyle and Dr. C. J. Officer Brown as openers; "Thyroid Diseases", Dr. F. Clements, Dr. G. R. A. Syme, Dr. W. E. King and Dr. W. Holman, with Dr. J. L. Grove as opener; "Fluids and Electrolytes in Health and Disease", Professor M. Ewing and Dr. W. B. Macdonald.

The Hobart Turf Club has arranged a race programme for Saturday, March 8, and complimentary tickets will be available to visiting members through the Congress Social Centre. This is mentioned at this stage so that members who are desirous of attending the races may alter their accommodation reservations if necessary.

As a final word, anybody who intends to come to Congress and who has not yet sent in an application for membership is requested to do so as soon as possible, not only because it will facilitate our organization, but also because it is of considerable advantage with respect to accommodation for any prospective member.

Deaths.

THE following deaths have been announced:

SCOTT.—Ian Mitchell King Scott, on October 20, 1957, at Melbourne.

ALLPORT.—Robert Murrell Allport, on October 22, 1957, at Gulgong, New South Wales.

Diary for the Month.

Nov. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
Nov. 6.—Western Australian Branch, B.M.A.: Branch Council.
Nov. 8.—Tasmanian Branch, B.M.A.: Branch Council.
Nov. 8.—Queensland Branch, B.M.A.: Council Meeting.
Nov. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Nov. 13.—Victorian Branch, B.M.A.: Branch Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales. Anti-Tuberculosis Association of New South Wales.

Queensland Branch (Honorary Secretary, 88 L'Estrange Terrace, Kelvin Grove, Brisbane, W.1): All applicants for Queensland State Government Insurance Office positions are advised to communicate with the Honorary Secretary of the Branch before accepting posts.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

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